Dr. E. Herbert

M.R.C. War Memorandum No. 7

Medical Research Council: Nerve Injuries Committee

AIDS TO THE INVESTIGATION OF PERIPHERAL NERVE INJURIES

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AIDS TO THE INVESTIGATION OF PERIPHERAL NERVE INJURIES

INTRODUCTION

This atlas is intended to help those less experienced in the examination of patients with lesions of peripheral nerves.

If possible, these examinations should be conducted in a side-room, where they can be free from interruptions and distractions. In testing both power and sensation, it is of the greatest importance that the patient be thoroughly warm for 15 to 30 minutes before the tests begin: a cold limb neither moves easily, nor feels acutely. The nature and object of the examination should be explained to the patient, so that his interest and co-operation are secured; and no session should be continued if the subject shows evidence of tiring or of lack of concentration.

A muscle may contract as a *prime mover,* as a *fixator,* as a *synergist,* or as an *antagonist.* Thus flexor carpi ulnaris acts as a *prime mover* when it flexes the wrist; as a *fixator* when it contracts to fix the pisiform bone for the action of abductor digiti minimi; as a *synergist* when the wrist is actively extended; and as an *antagonist* when the fingers, but not the wrist, are extended. In certain conditions muscles may continue to act in one of these ways, but not in others; thus in hysterical paralyses they may act synergically, but not as prime movers, and in the stage of recovery from peripheral nerve lesions, a muscle may contract as a fixator before it can be used voluntarily as a prime mover.

As far as possible the action of each muscle should be separately observed, and a careful note made of those in which power has been retained, as well as of those which are weak or paralysed. The following system is suggested to record the state of each muscle:

0. No contraction.
1. Flicker or trace of contraction.
2. Active movement, with gravity eliminated.
3. Active movement against gravity.
4. Active movement against gravity and resistance.
5. Normal power.

The models employed in this work were not picked to show unusual muscular development; but the ease with which muscular contractions are identified varies with the build of the patient, and it is of extreme importance that examiners should both *look for* and *try to feel* the contraction of an accessible muscle.

Muscles have been arranged in the order of the origin of their branches from the parent nerve trunk, an arrangement which may be of use in determining the level of a lesion. Usually only one method of testing each muscle is illustrated; this is the one which seemed the simplest and most generally useful. To include alternative methods of testing power would have greatly enlarged the memorandum, and exceeded its purpose. The examiner should apply the tests exactly as they are illustrated, because the technique shown will eliminate many of the traps for the inexperienced provided by " trick " movements and the like.

The usual nerve-supply to each muscle is stated in the legends, and the spinal segments from which it is derived. When one of the latter is of controlling importance, it is printed in heavier type. A table showing limb muscles arranged by nerves, in order of innervation, is printed on page iii of the cover.

For the accurate determination of loss of sensation to light touch, hairy parts should be shaved, and for mapping out such areas a fine wisp of cotton wool should be used, and the area should be enclosed by a *continuous* line. For mapping out loss to pin prick, a fine needle is best, and this area (usually smaller than that for loss to light touch) should be enclosed by a *dotted* line. If circumstances permit, loss to deep pressure as determined by a blunt point should be charted by cross hatching / / / /, and loss of postural sense in joints should be described on the chart. Stimuli should not follow each other too quickly, because if conduction is delayed the patient's response may then refer not to immediate stimulus but to a previous one. In all cases the test should be made from the anaesthetic toward the normal area; except that when hypersensitivity is complained of, the area affected may be delimited by dragging the point of a pin toward the hyperaesthetic area, which is indicated on the chart.

The area supplied by any one nerve varies from patient to patient, and depends on the extent to which its territory is overlapped by adjacent nerves; examples of this are illustrated for the median (Fig. 61) and ulnar (Fig. 62) nerves. The areas shown for other nerves are approximately *maximum* areas within which sensory changes may be found, if a lesion is present which affects their sensory function.

The atlas has been prepared by the staff of the Department of Surgery, University of Edinburgh.

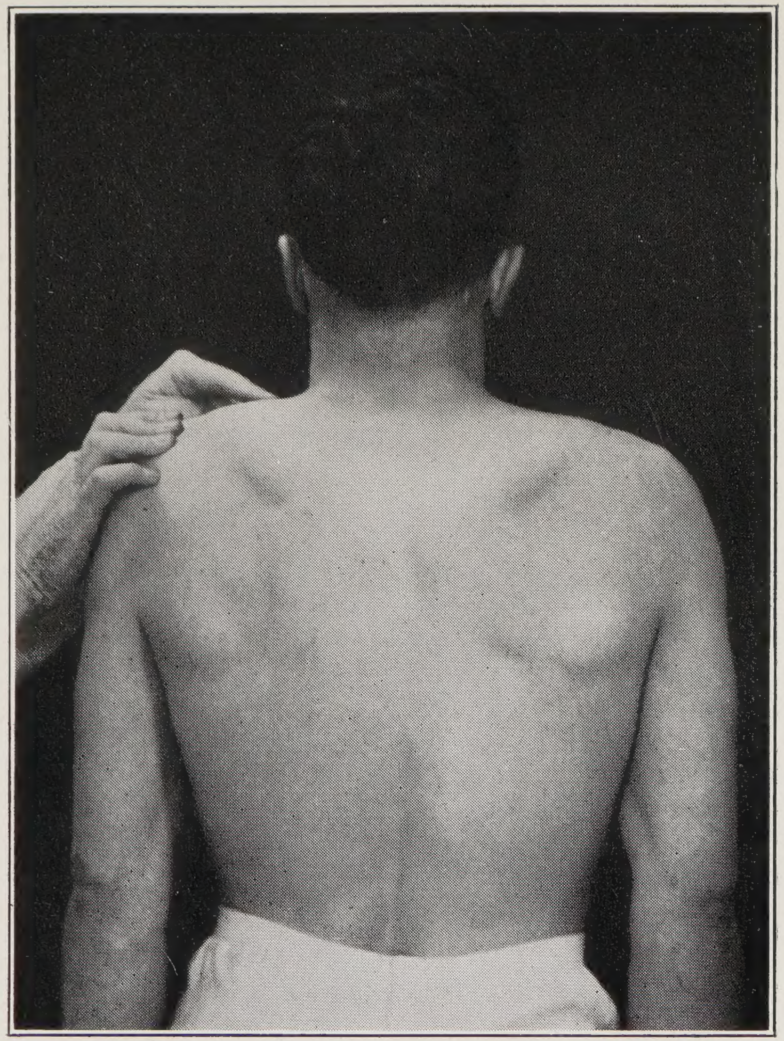


FIGURE 1.—TRAPEZIUS (Accessory nerve). The patient is shrugging his shoulders against resistance. The upper border of the muscle belly can be seen and felt.

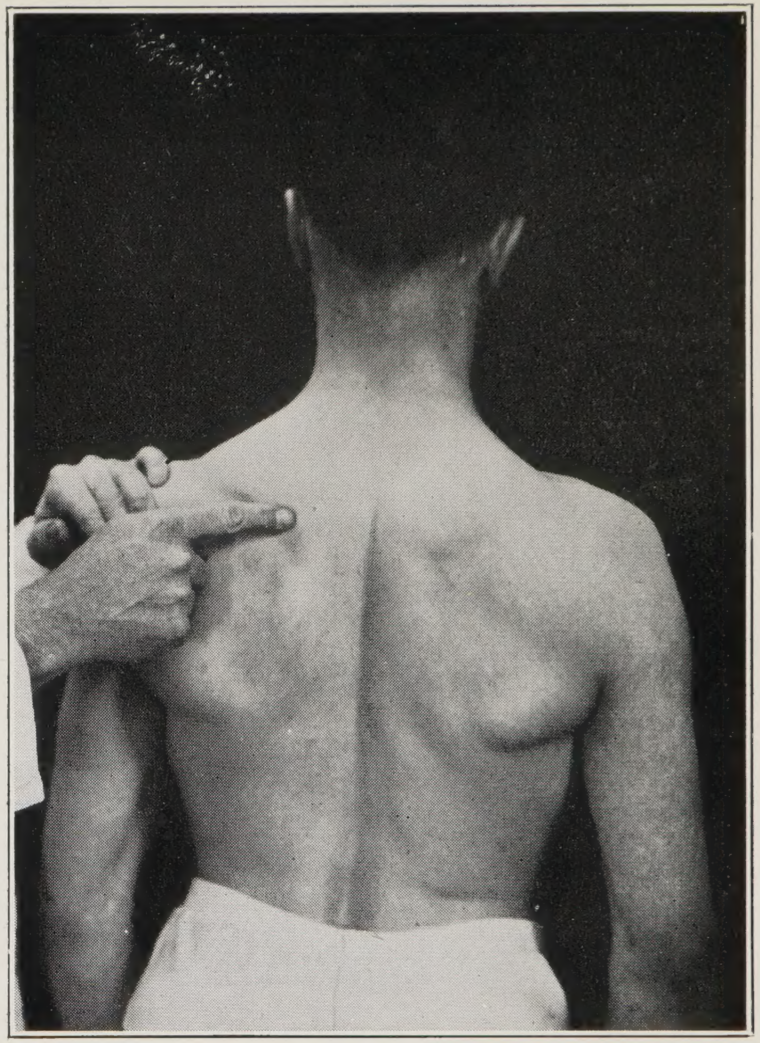
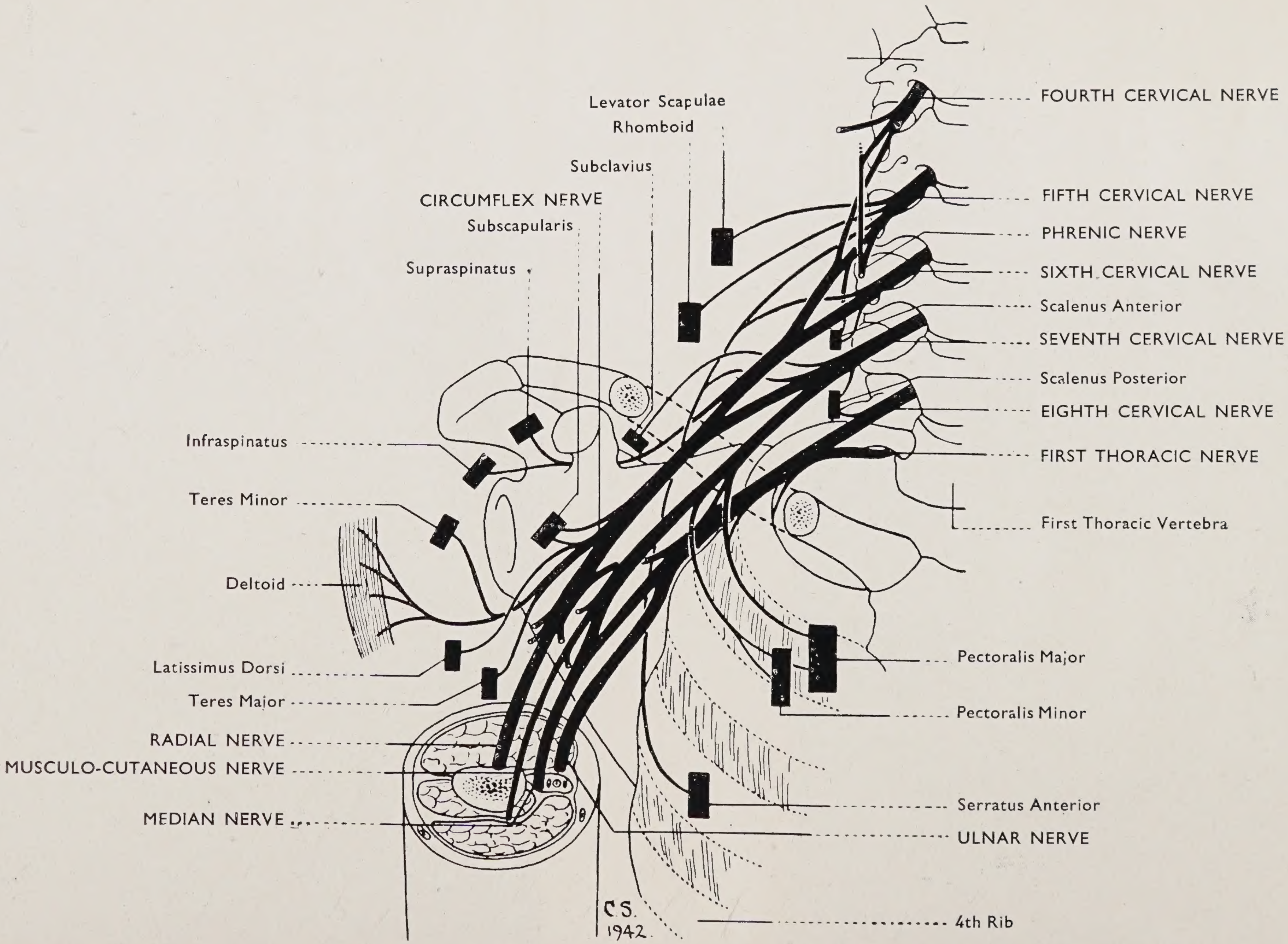


FIGURE 2.—TRAPEZIUS (Accessory nerve). The patient is bracing his shoulders backward against resistance. The middle part of the muscle belly can be seen and felt.


Levator Scapulae
Rhomboid
Subclavius
CIRCUMFLEX NERVE
Subscapularis
Supraspinatus
Infraspinatus
Teres Minor
Deltoid
Latissimus Dorsi
Teres Major
RADIAL NERVE
MUSCULO-CUTANEOUS NERVE
MEDIAN NERVE
FOURTH CERVICAL NERVE
FIFTH CERVICAL NERVE
PHRENIC NERVE
SIXTH CERVICAL NERVE
Scalenus Anterior
SEVENTH CERVICAL NERVE
Scalenus Posterior
EIGHTH CERVICAL NERVE
FIRST THORACIC NERVE
First Thoracic Vertebra
Pectoralis Major
Pectoralis Minor
Serratus Anterior
ULNAR NERVE
4th Rib
C.S.
1942

I. Diagram of the BRACHIAL PLEXUS, its branches and the muscles which they supply.
(Modified from Pitres and Testut.)

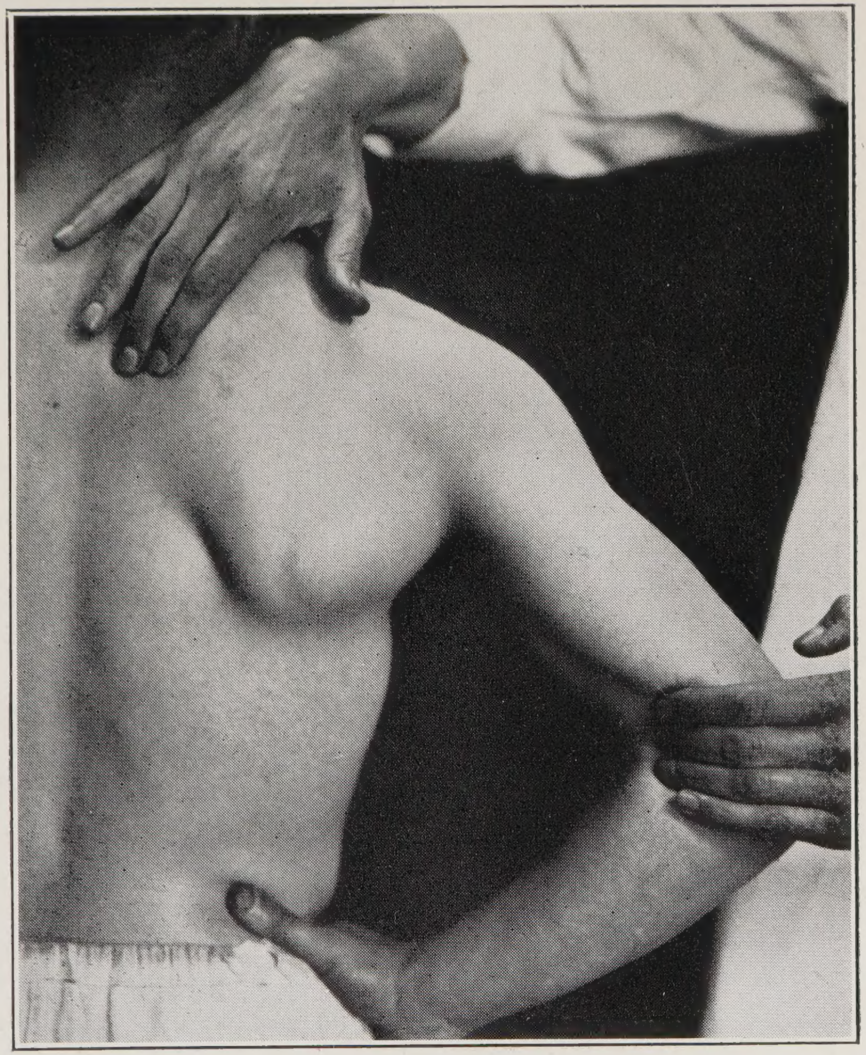


FIGURE 3.—RHOMBOIDS (Nerve to rhomboids; C4, C5). The patient is trying to brace his shoulder backward against resistance. The muscle bellies can be felt and sometimes seen.

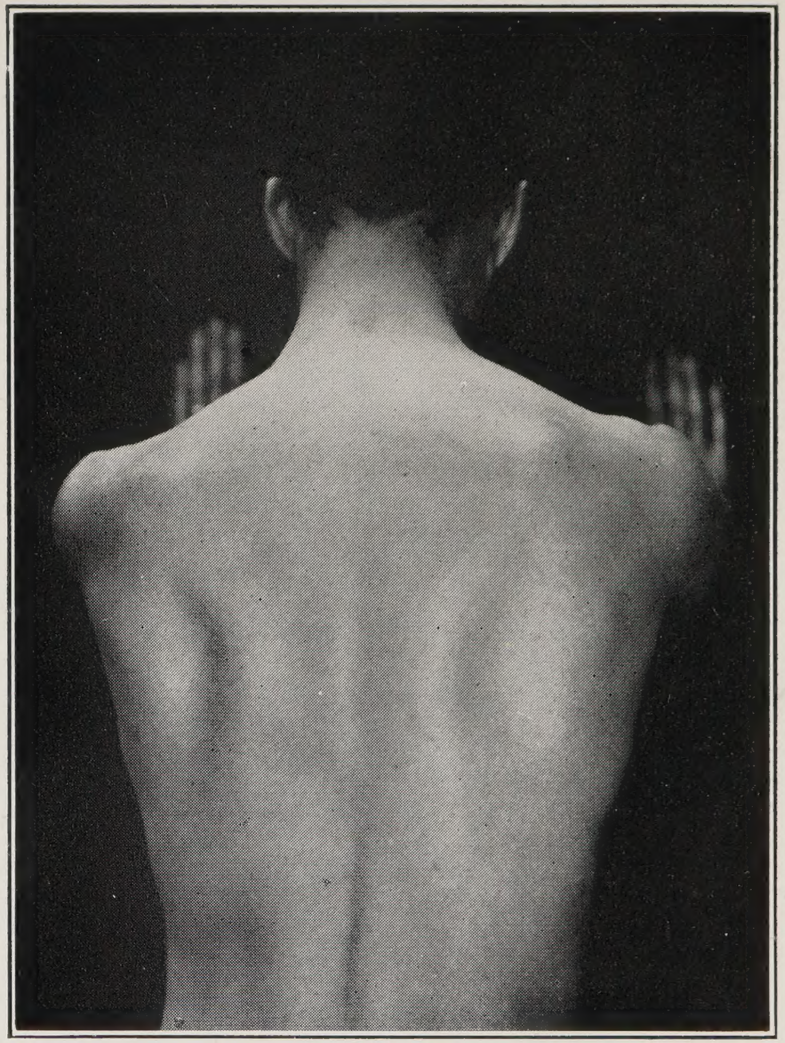


FIGURE 4.—SERRATUS ANTERIOR (Nerve to serratus anterior; C5, C6, C7). The patient pushes hard against some immovable object. The medial borders of the scapulae remain close to the thoracic wall, provided that there is no weakness of the trapezius muscle.

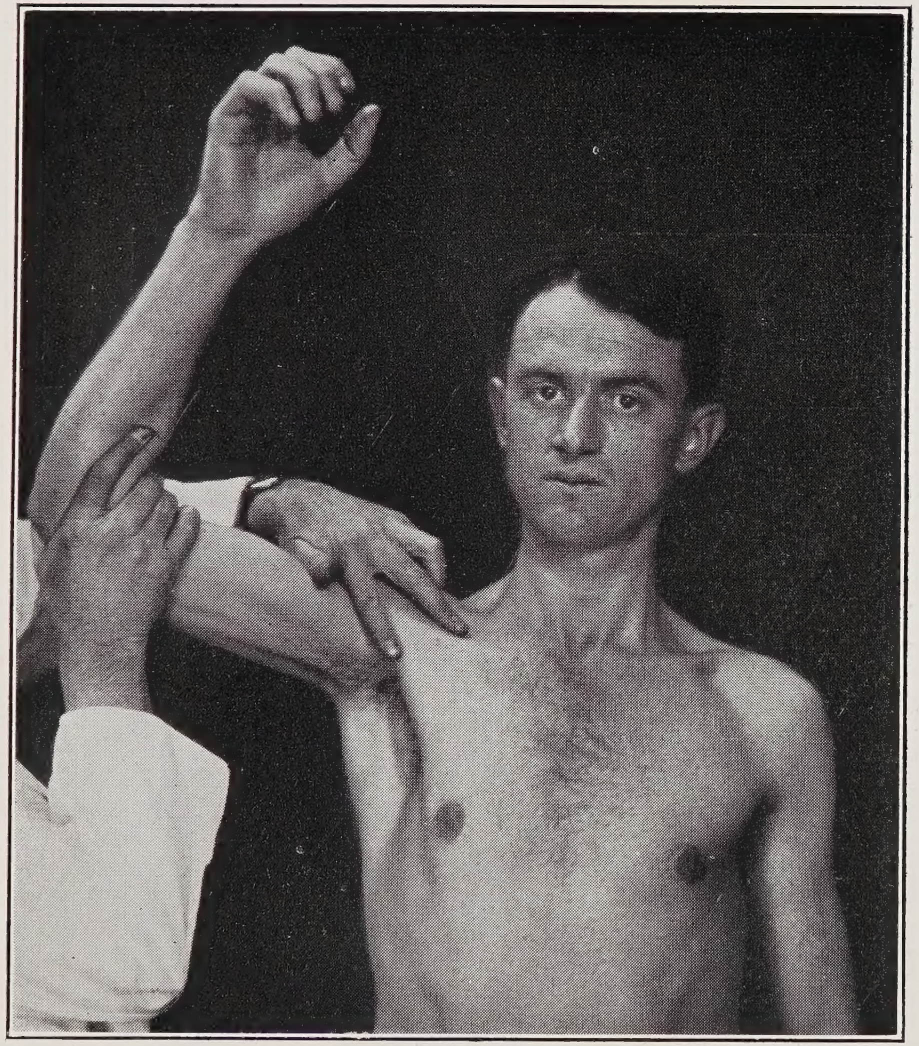
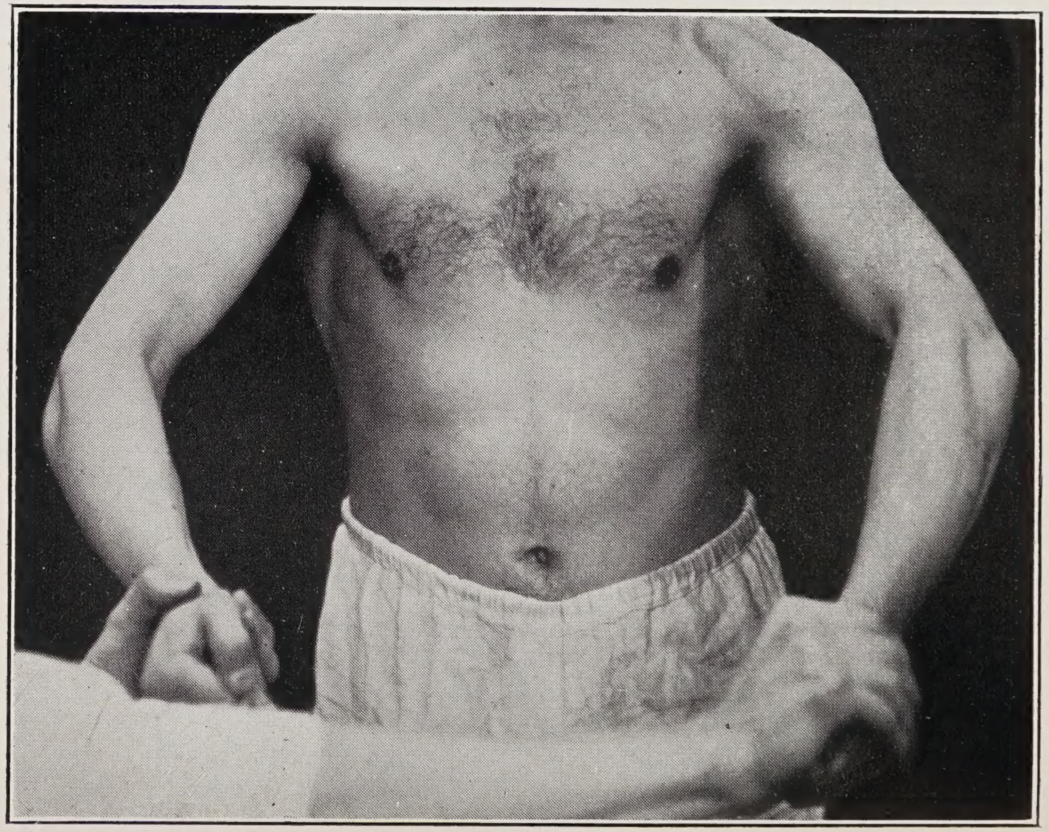


Figure 5.—PECTORALIS MAJOR, *Clavicular Part* (Lateral and medial pectoral nerves; **C5, C6, C7,** C8, T1). The patient raises the arm forwards above the horizontal and is trying to adduct it against resistance. The clavicular part of the muscle can be seen, and felt (by the examiner's middle finger); and in this photograph the sterno-costal part can also be seen, and felt (by the examiner's index finger).

Figure 6.—PECTORALIS MAJOR, *Sterno-costal Part* (Lateral and medial pectoral nerves; C5, C6, **C7, C8, T1**). The patient raises the arms to below the horizontal and is trying to adduct them against resistance. The sterno-costal parts of the muscle can be seen and felt.



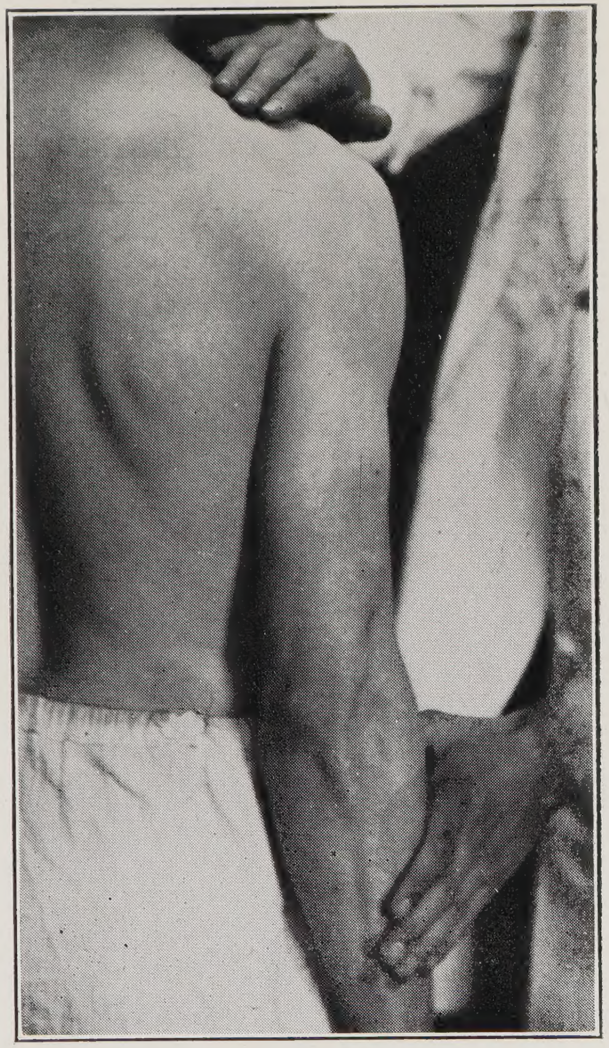


FIGURE 7.—SUPRASPINATUS (Suprascapular nerve; C4, **C5**). The patient is trying to abduct the arm against resistance. The muscle belly can be felt and sometimes seen.

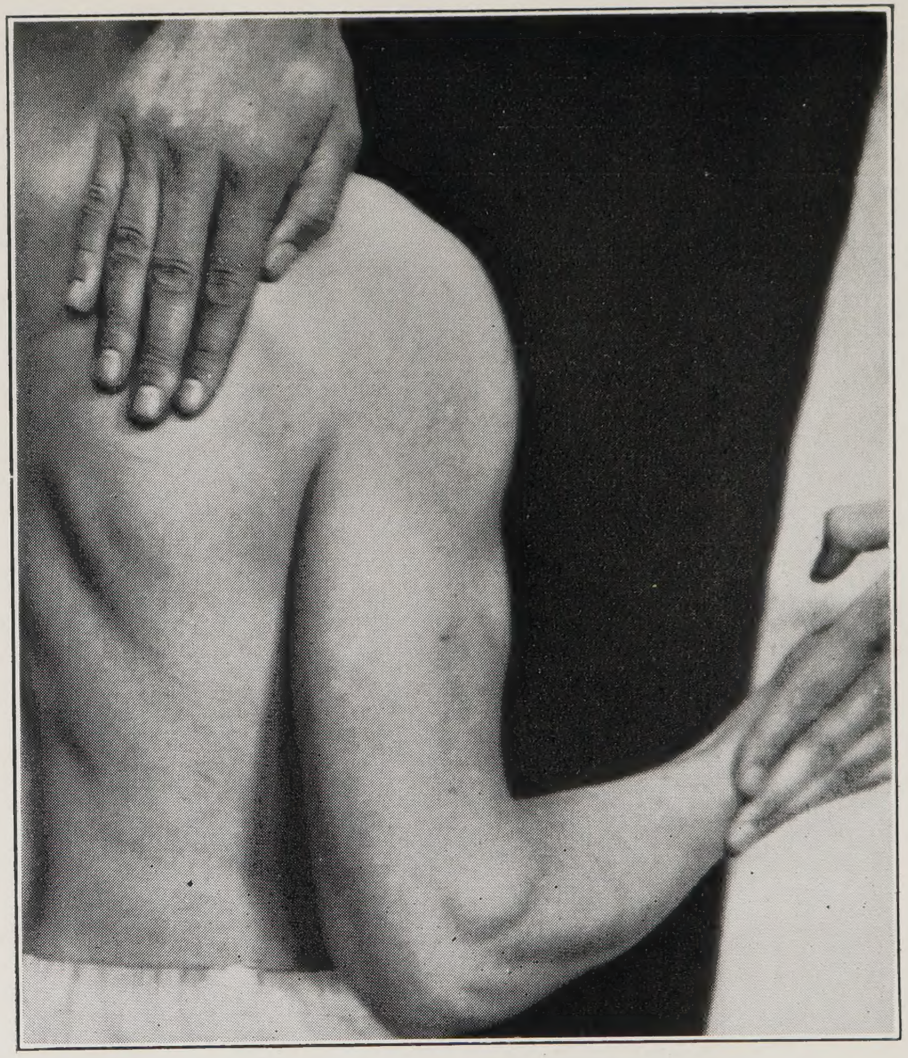


FIGURE 8.—INFRASPINATUS (Suprascapular nerve; C4, **C5,** C6). With the elbow kept to the side, the patient is trying to carry the flexed forearm backward against resistance, i.e. to produce external rotation at the shoulder joint. The muscle belly can be felt and sometimes seen.

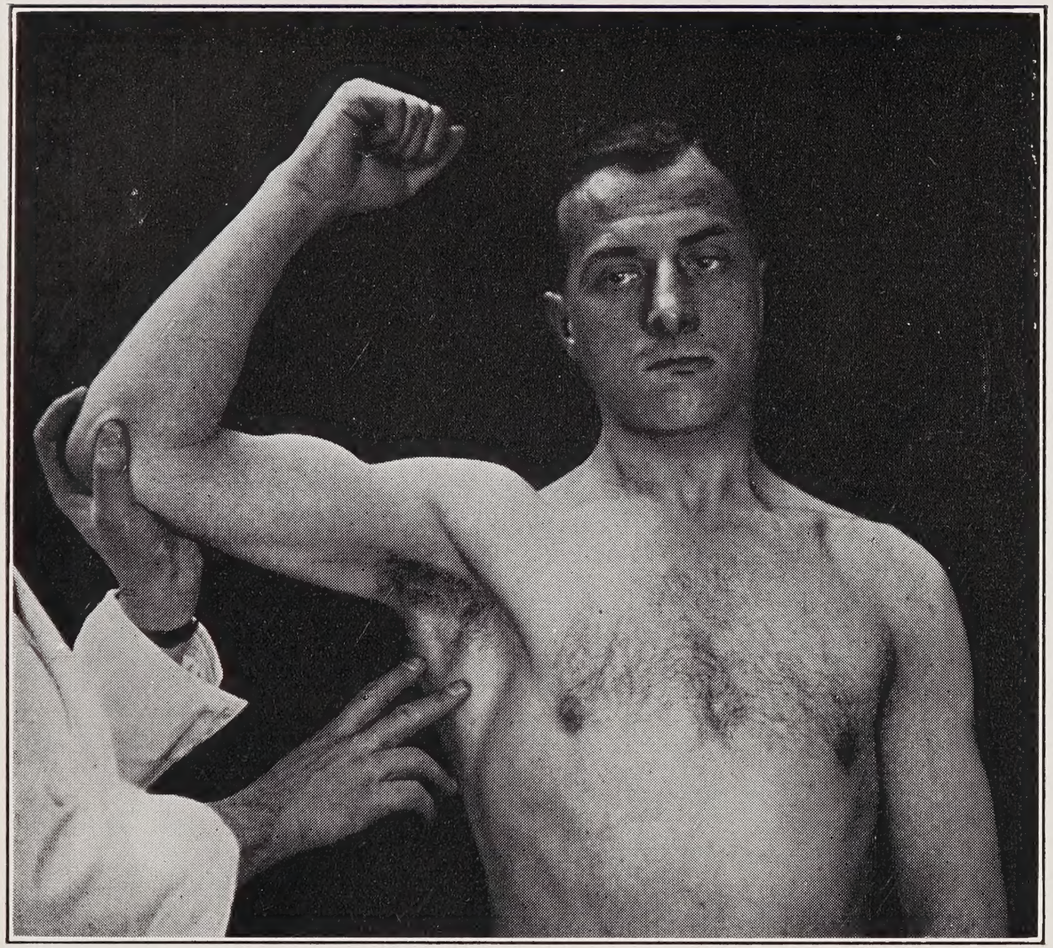


FIGURE 9.—LATISSIMUS DORSI (Nerve to latissimus dorsi; C6, **C7,** C8). The patient is trying to adduct the horizontally and laterally extended arm against resistance. The muscle can be seen, and felt (by the examiner's middle finger). The examiner's index finger is palpating teres major.

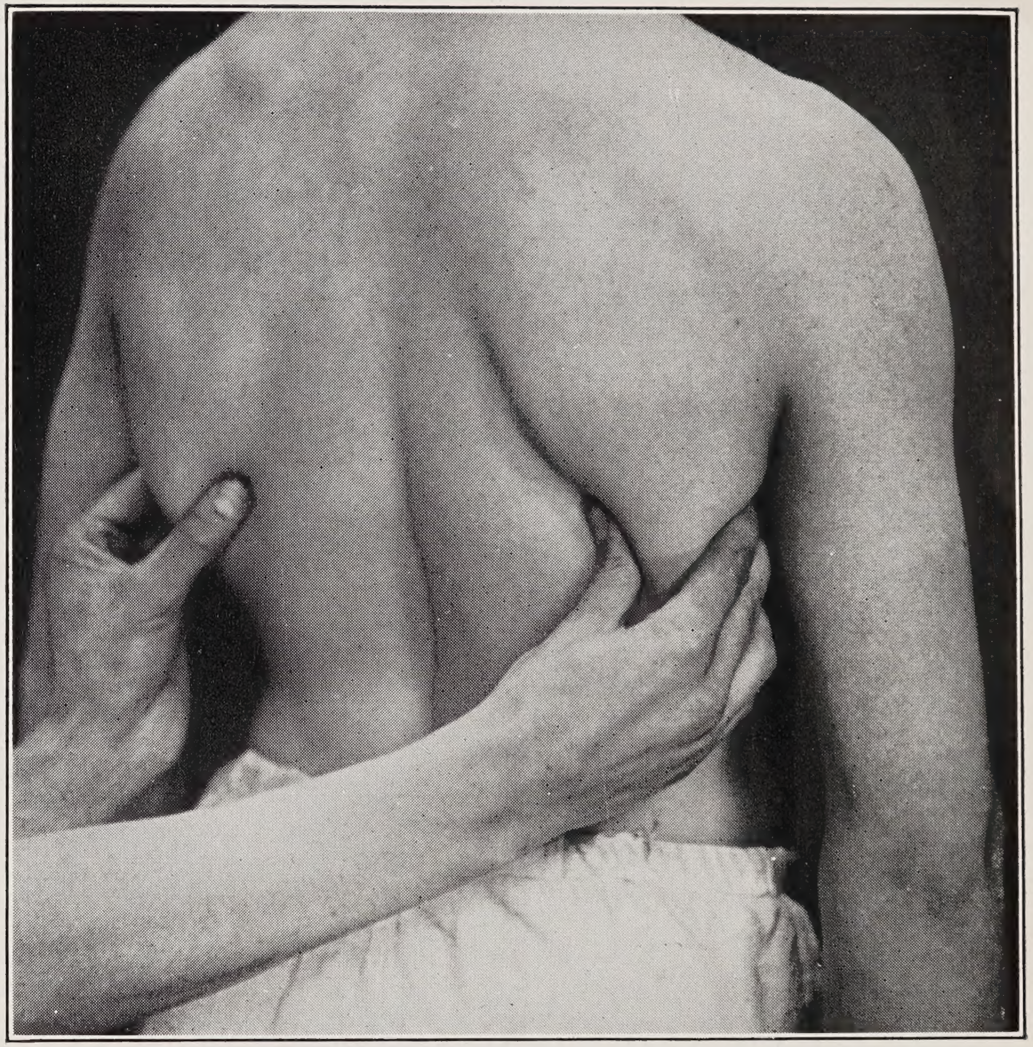
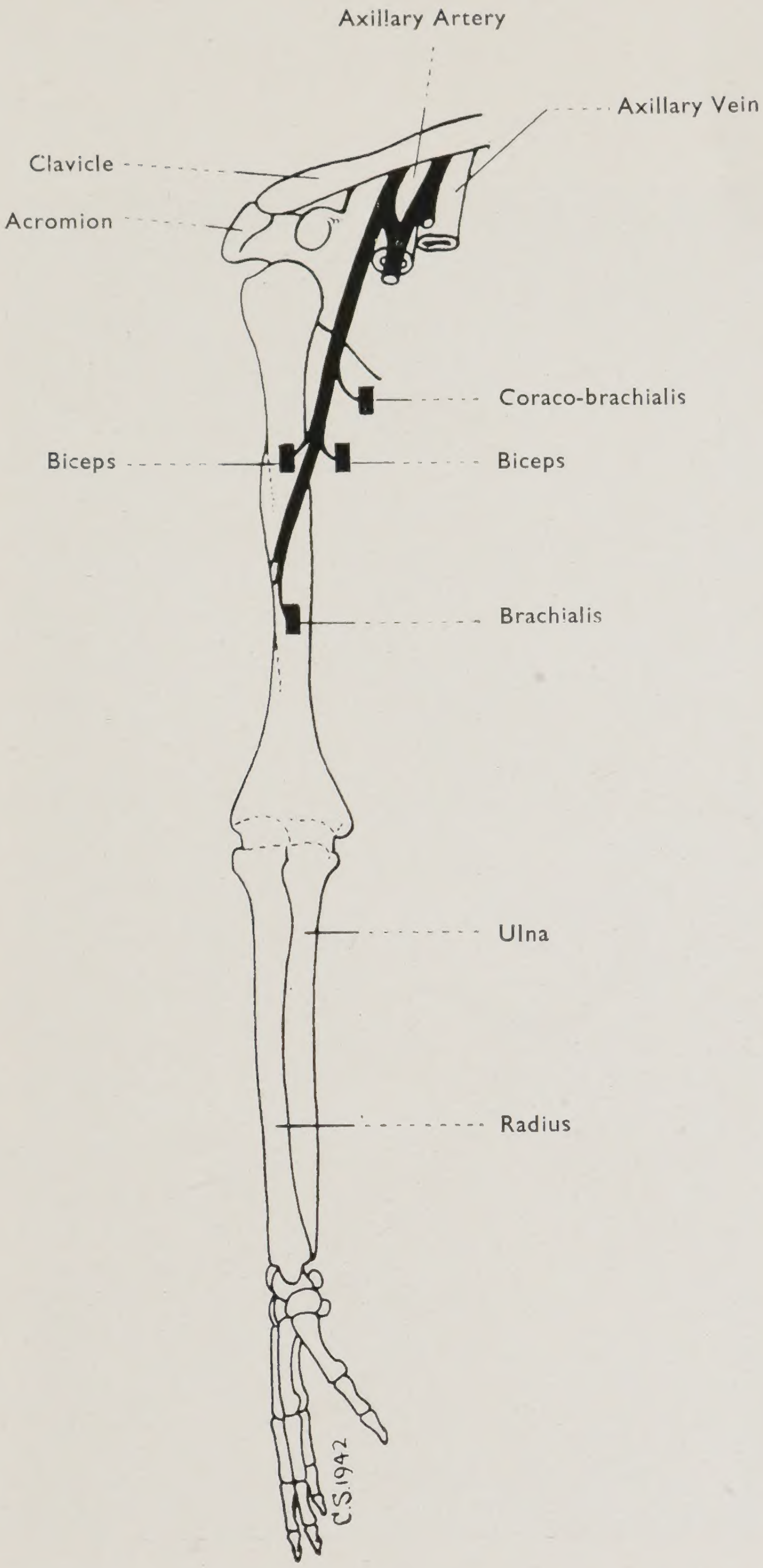


FIGURE 10.—LATISSIMUS DORSI (Nerve to latissimus dorsi; C6, **C7,** C8). The patient coughs. The muscle bellies can be felt and sometimes seen.


Axillary Artery
Axillary Vein
Clavicle
Acromion
Coraco-brachialis
Biceps
Biceps
Brachialis
Ulna
Radius
C.S. 1942

II. Diagram of the MUSCULO-CUTANEOUS NERVE and the muscles which it supplies (Modified from Pitres and Testut.

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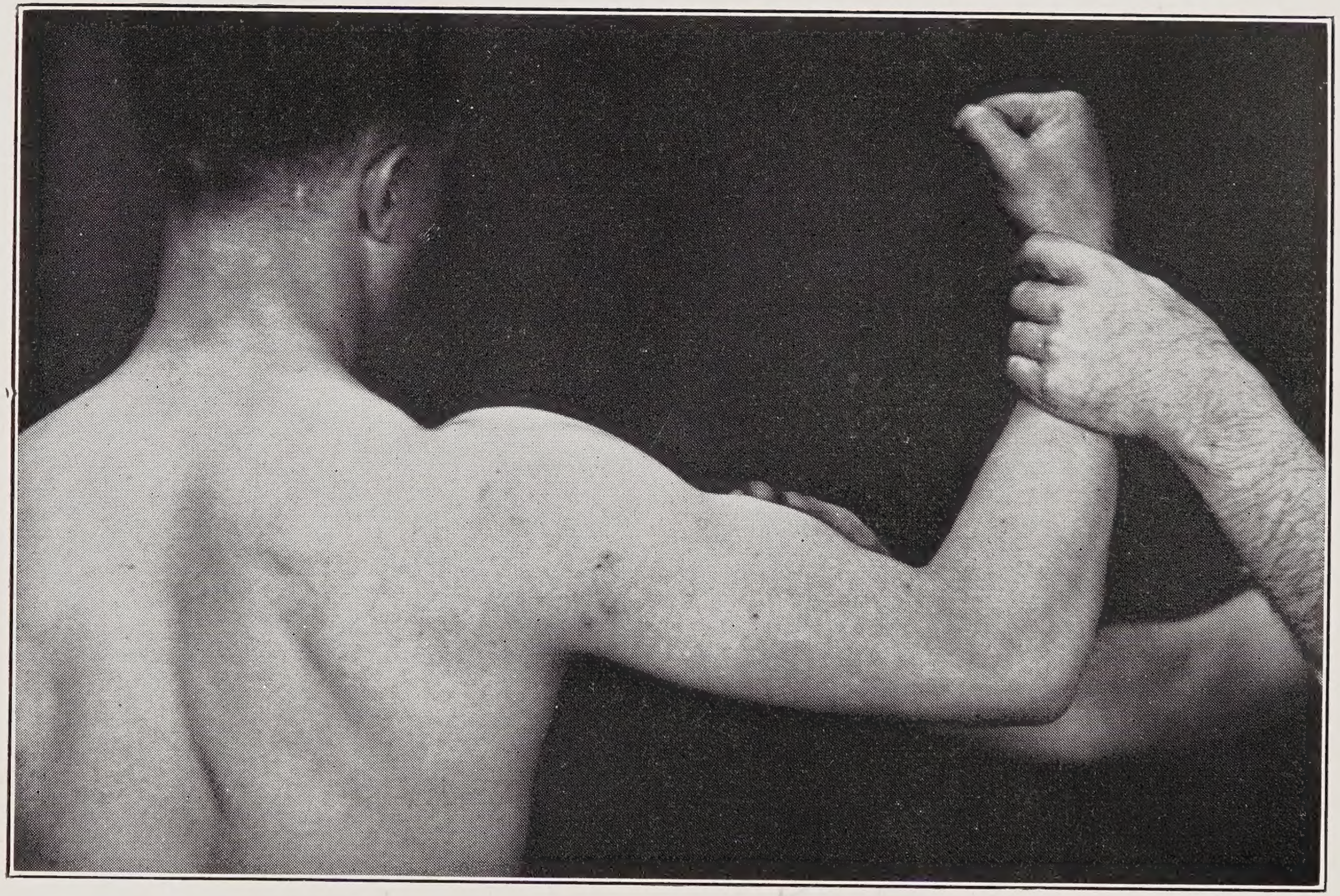
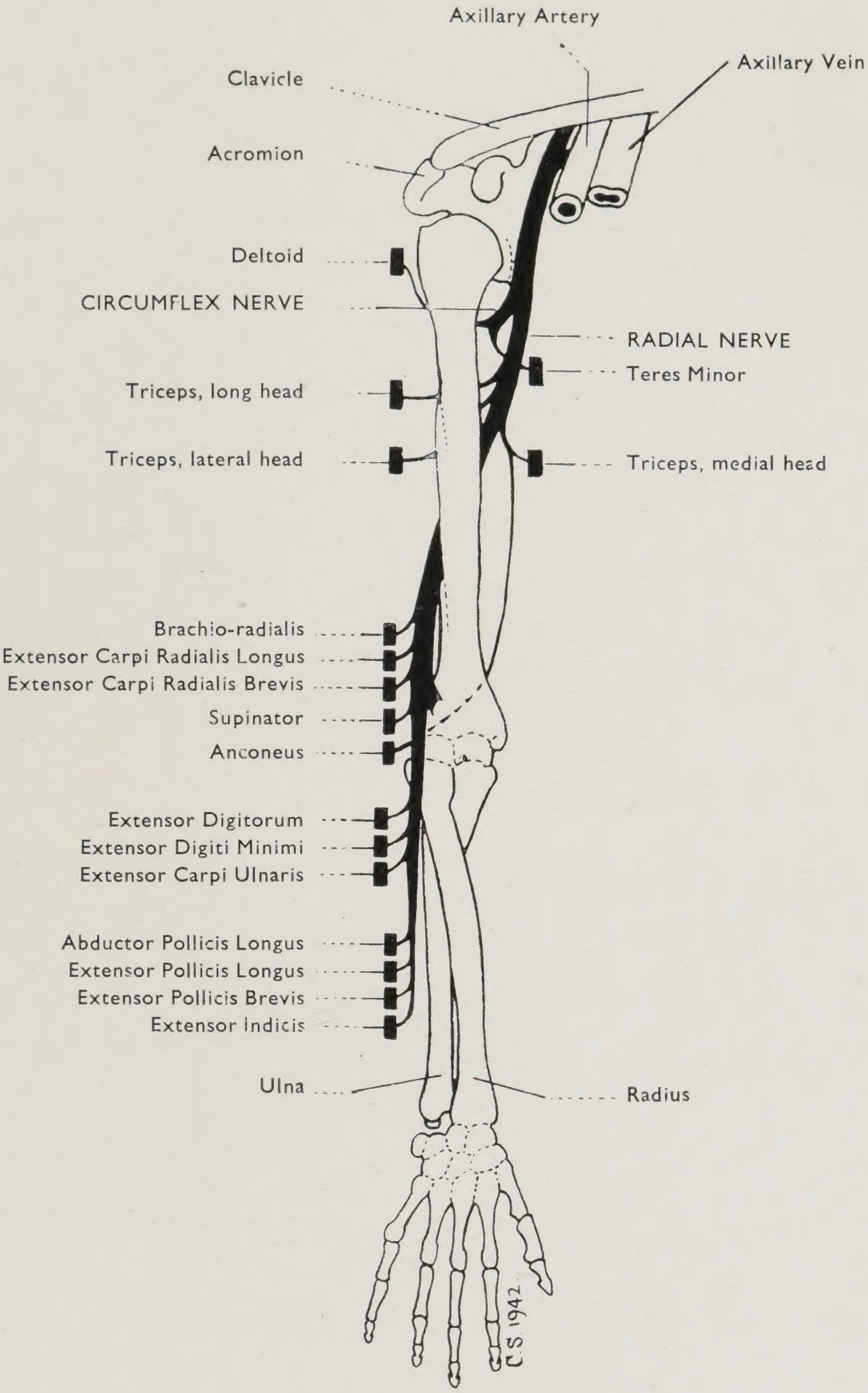


Figure 11.—BICEPS (Musculo-cutaneous nerve; C5, **C6**). The patient is trying to flex the supinated forearm against resistance. The muscle belly can be seen and felt.


Axillary Artery
Axillary Vein
Clavicle
Acromion
Deltoid
CIRCUMFLEX NERVE
RADIAL NERVE
Teres Minor
Triceps, long head
Triceps, lateral head
Triceps, medial head
Brachio-radialis
Extensor Carpi Radialis Longus
Extensor Carpi Radialis Brevis
Supinator
Anconeus
Extensor Digitorum
Extensor Digiti Minimi
Extensor Carpi Ulnaris
Abductor Pollicis Longus
Extensor Pollicis Longus
Extensor Pollicis Brevis
Extensor Indicis
Ulna
Radius
C.S. 1942

III. Diagram of the CIRCUMFLEX and RADIAL NERVES and the muscles which they supply. (Modified from Pitres and Testut.)

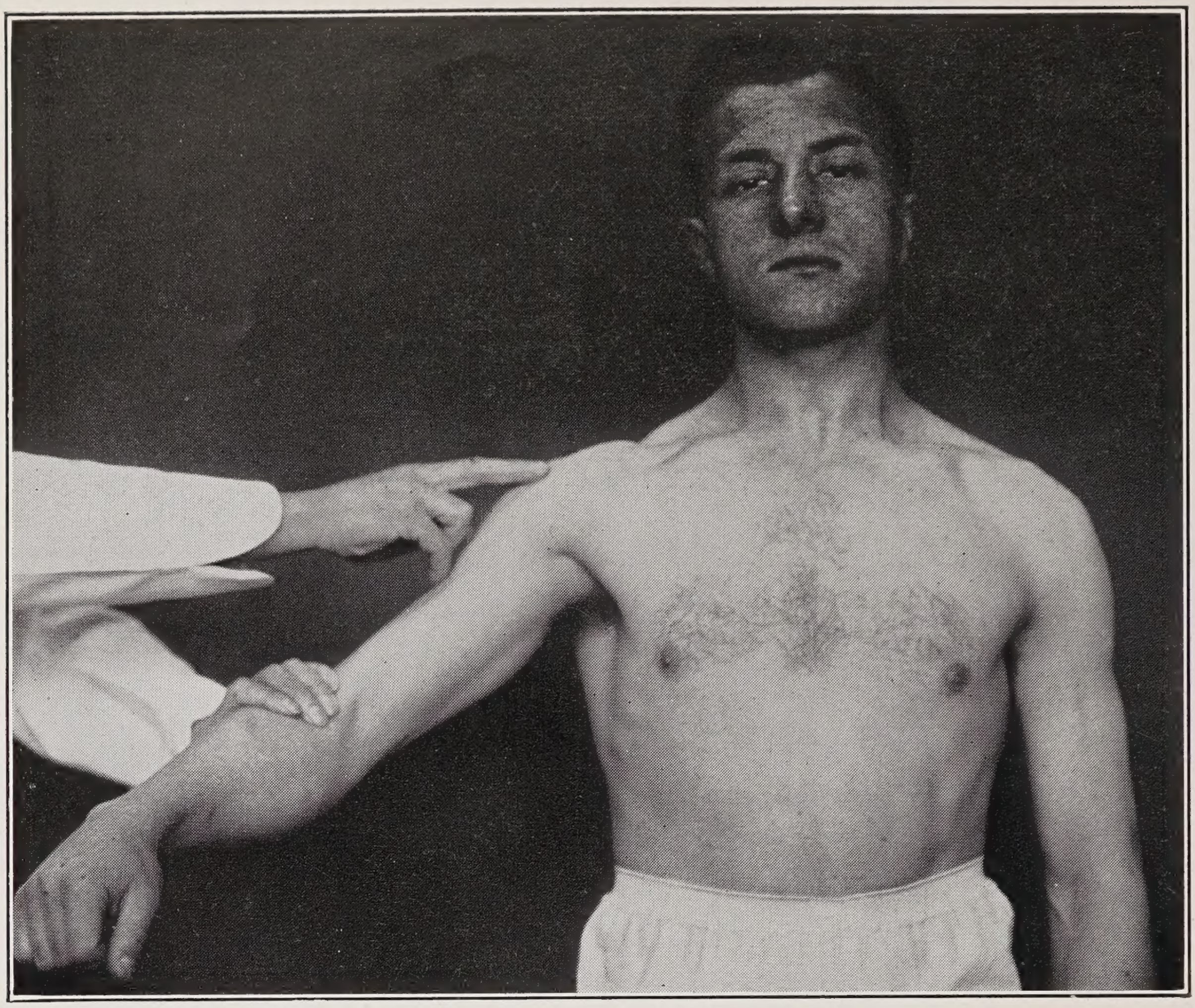


FIGURE 12.—DELTOID (Circumflex nerve; **C5,** C6). The patient is trying to maintain abduction against resistance; the angle between the arm and the side must be more than 15° and less than 90°. The muscle belly can be seen and felt.

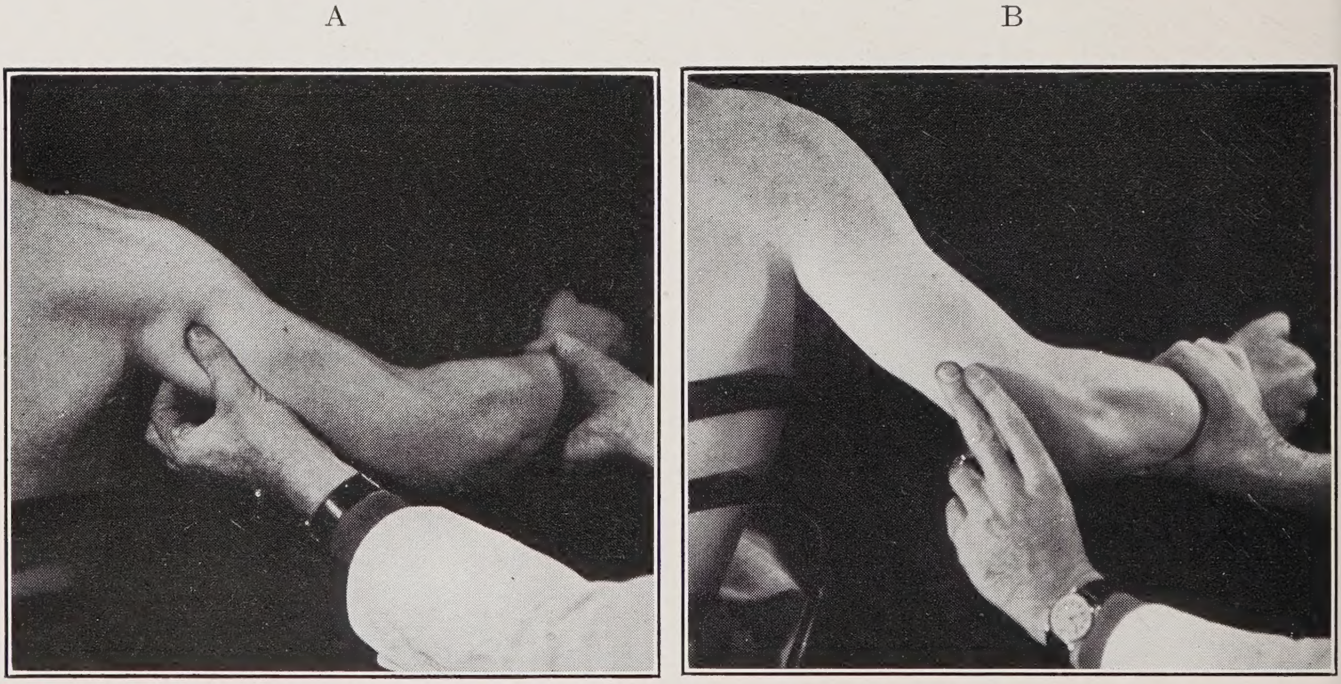


FIGURE 13 (A and B).—TRICEPS (Radial nerve; **C7, C8,** T1). With the arm held in such a position that the action of gravity on the forearm is eliminated, the patient is trying to extend the forearm against resistance. The muscle bellies can be felt and sometimes seen. A = long head; B = whole muscle.

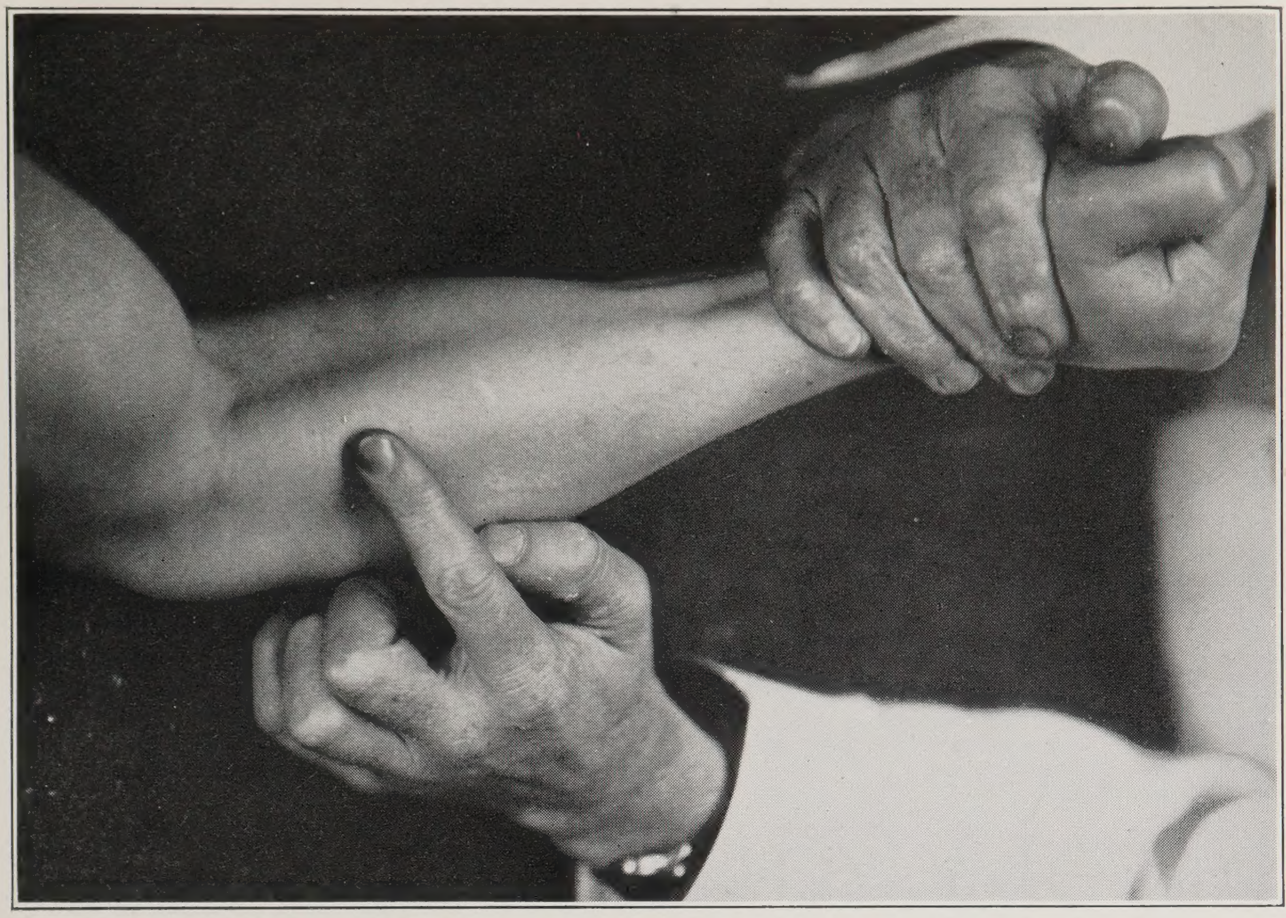


Figure 14.—BRACHIO-RADIALIS (Radial nerve; C5, **C6**). With the forearm midway between pronation and supination, the patient is trying to flex the forearm against resistance. The muscle belly can be seen and felt.

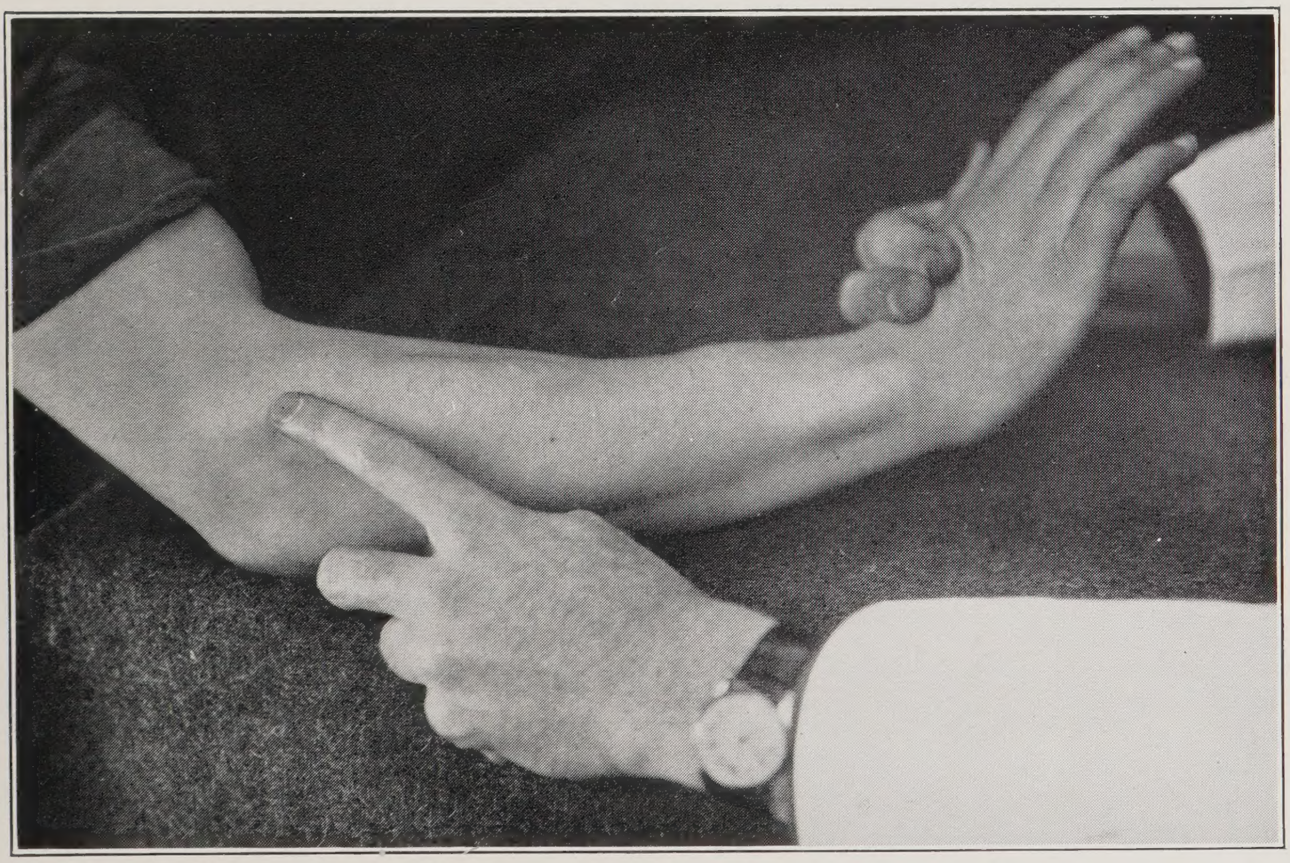


Figure 15.—EXTENSOR CARPI RADIALIS LONGUS (Radial nerve; C6, **C7**). With the fingers extended, the patient is trying to extend the wrist to the radial side against resistance. The muscle belly can be felt and sometimes seen.

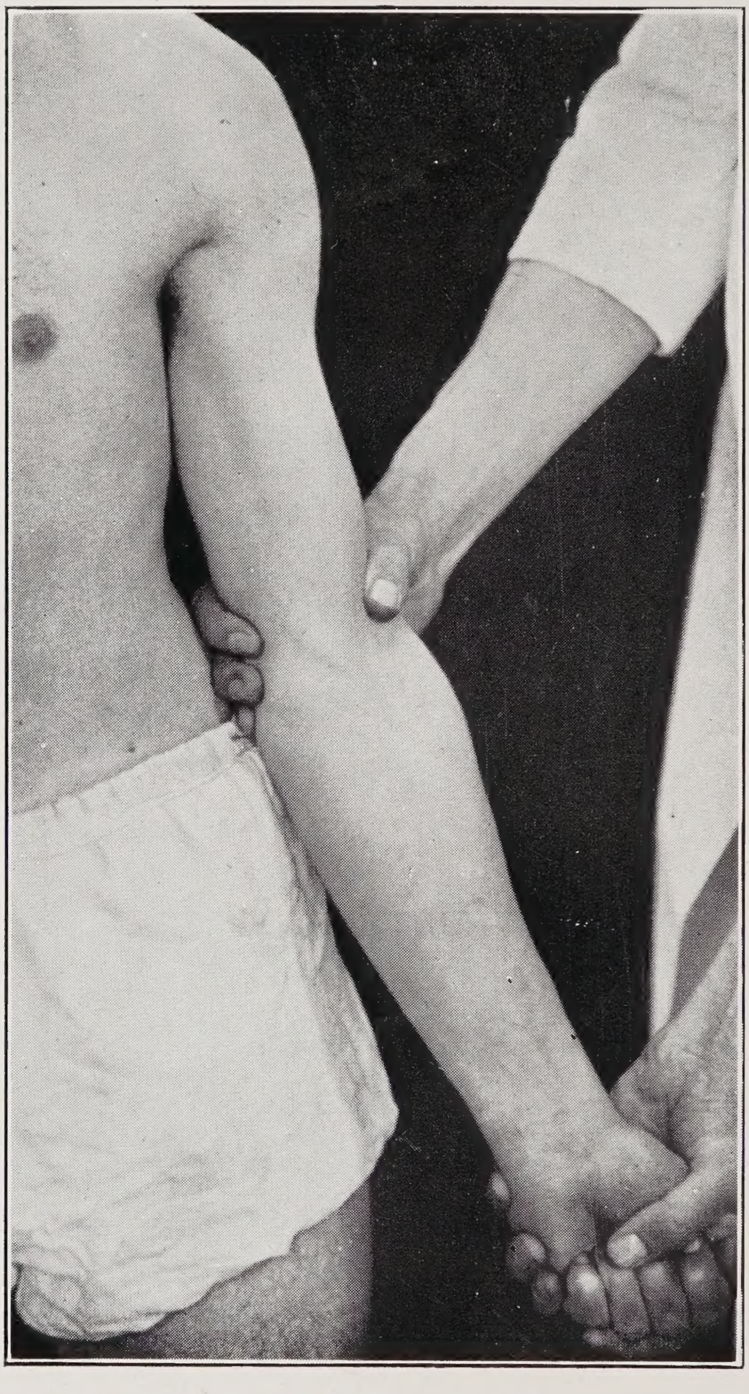


FIGURE 16.—SUPINATOR (Radial nerve; C5, **C6**). The patient extends the arm by the side, and is resisting the examiner's attempt to pronate the hand.

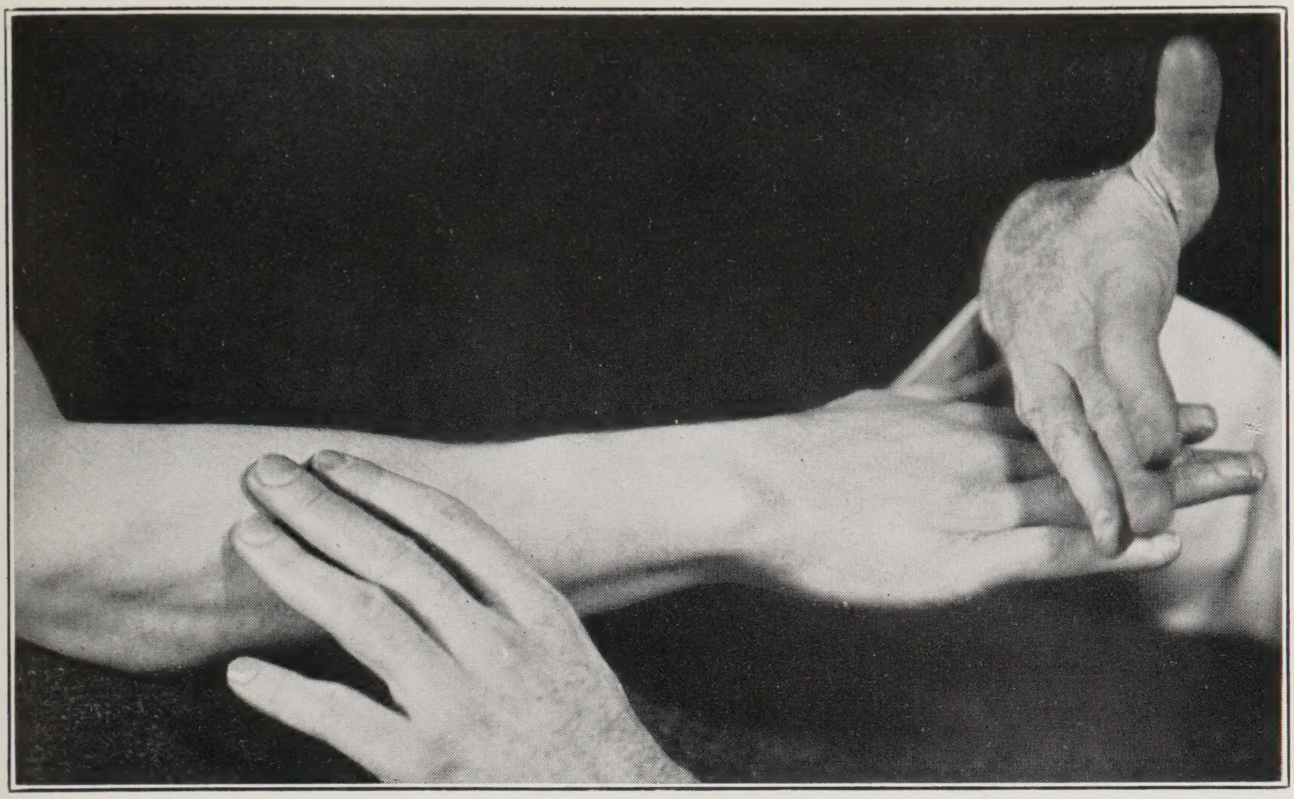


Figure 17.—EXTENSOR DIGITORUM (Radial nerve; **C7,** C8). The patient is resisting an attempt to flex the fingers at the metacarpo-phalangeal joints. The muscle belly can be felt and sometimes seen.

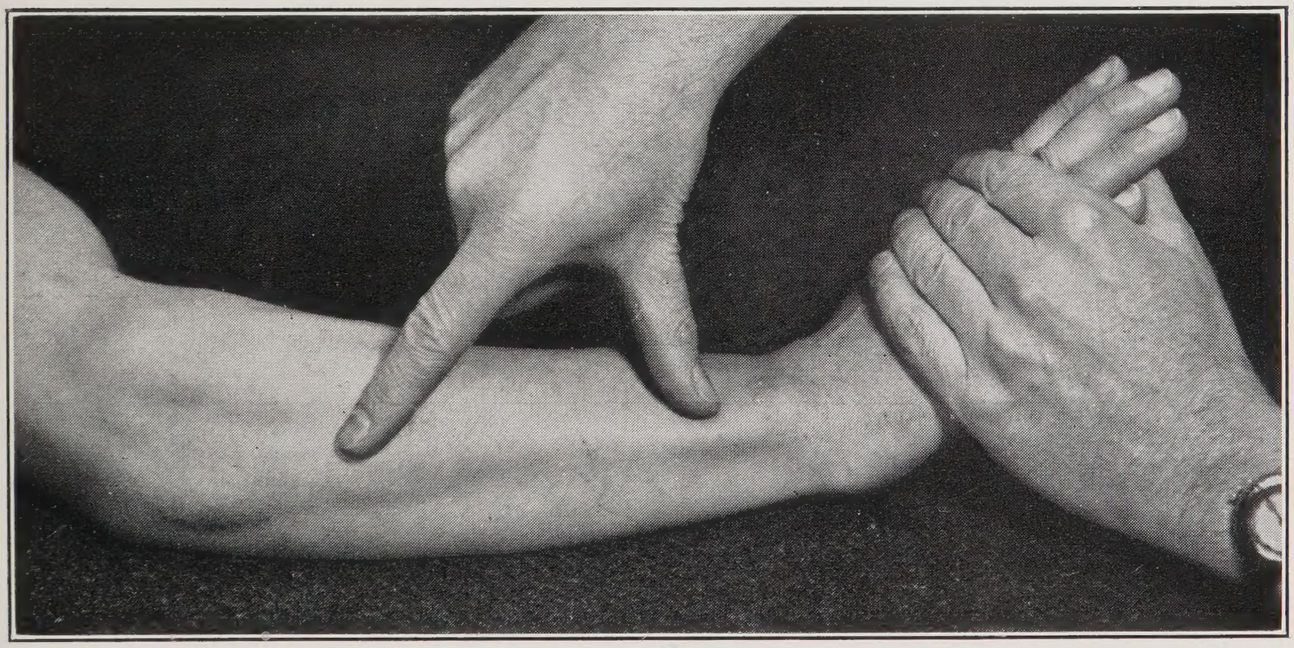


Figure 18.—EXTENSOR CARPI ULNARIS (Radial nerve; **C7,** C8). The patient is trying to extend the wrist joint to the ulnar side against resistance. The muscle belly can be felt and sometimes seen, and the tendon can be seen.

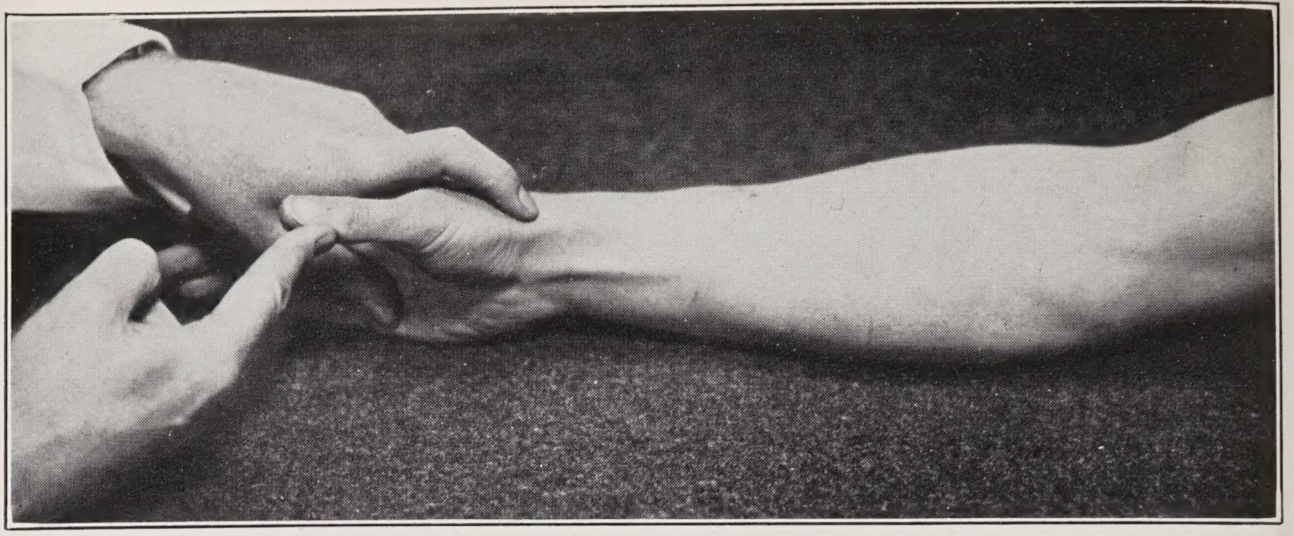


Figure 19.—ABDUCTOR POLLICIS LONGUS (Radial nerve; C7, **C8**). The patient is trying to abduct the thumb in a plane at right angles to the palm. The tendon can be seen and felt.

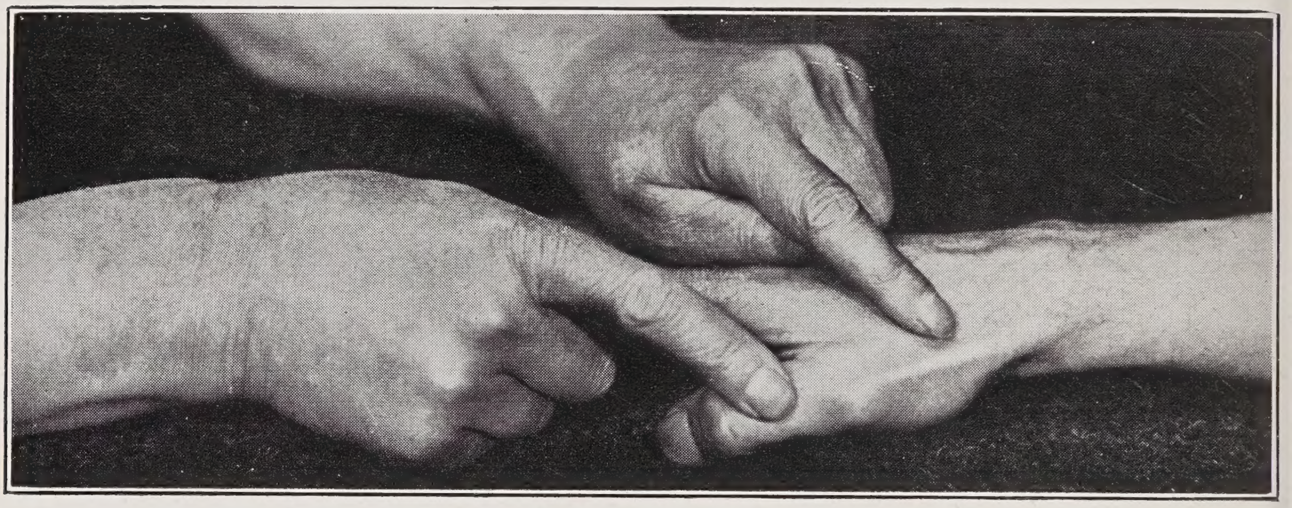


Figure 20.—EXTENSOR POLLICIS BREVIS (Radial nerve; C8). The patient is resisting an attempt to flex the thumb at the metacarpo-phalangeal joint. The tendon can be seen and felt.

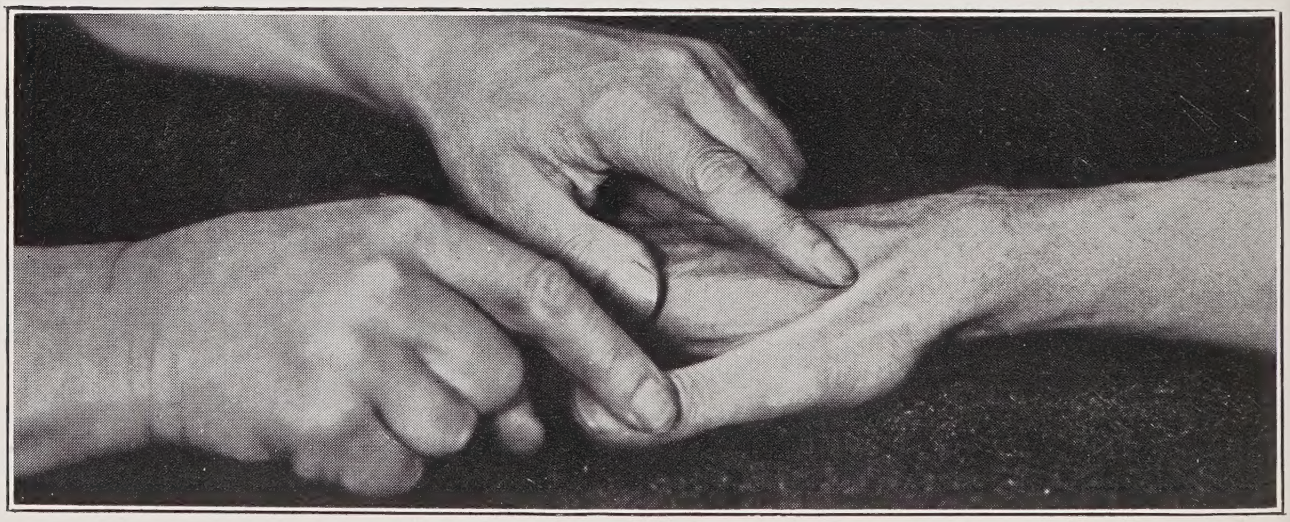
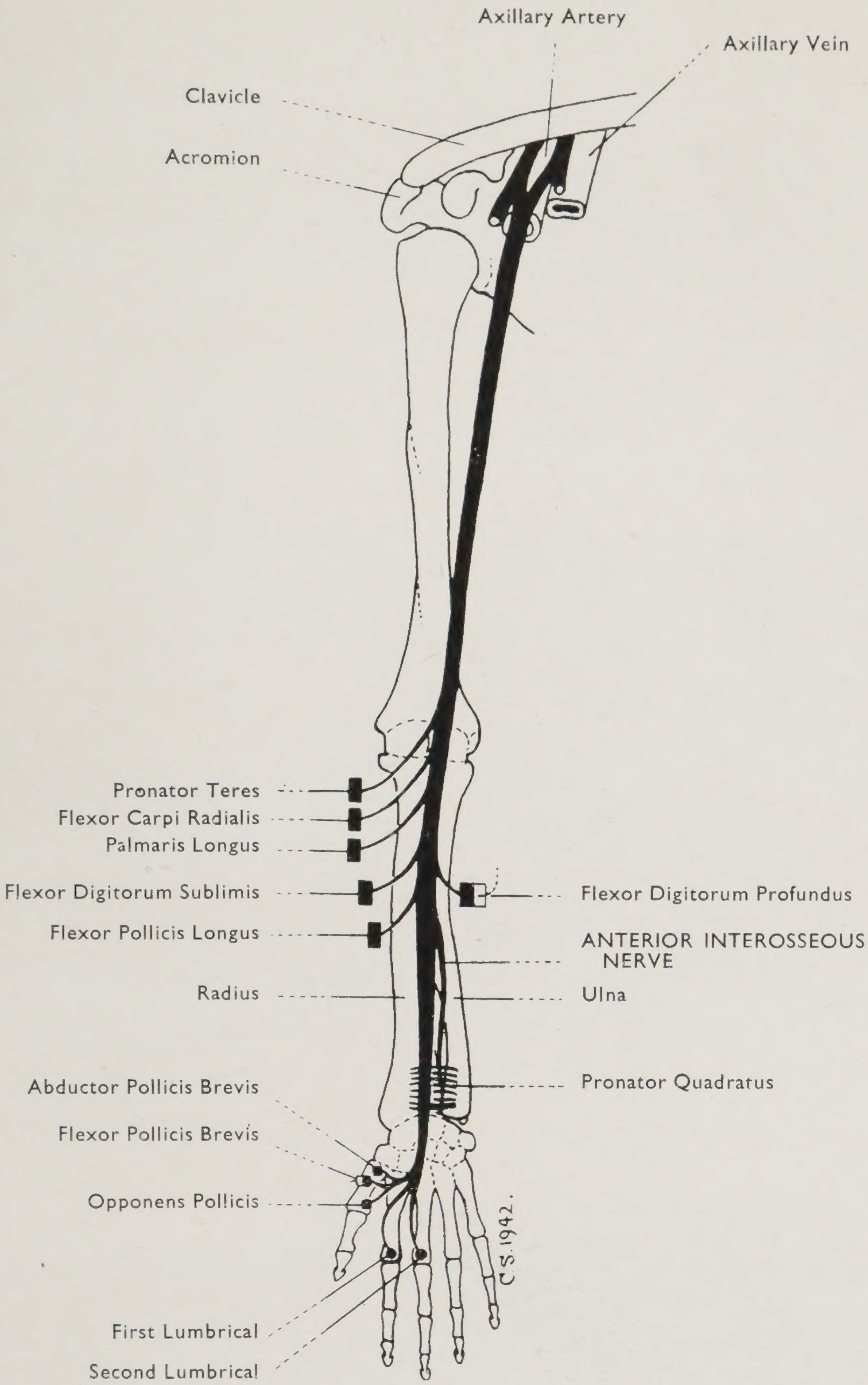


Figure 21.—EXTENSOR POLLICIS LONGUS (Radial nerve; C8). The patient is resisting an attempt to flex the thumb at the interphalangeal joint. The tendon can be seen and felt.


Axillary Artery
Axillary Vein
Clavicle
Acromion
Pronator Teres
Flexor Carpi Radialis
Palmaris Longus
Flexor Digitorum Sublimis
Flexor Pollicis Longus
Radius
Abductor Pollicis Brevis
Flexor Pollicis Brevis
Opponens Pollicis
First Lumbrical
Second Lumbrical
Flexor Digitorum Profundus
ANTERIOR INTEROSSEOUS NERVE
Ulna
Pronator Quadratus
C.S. 1942.

IV. Diagram of the MEDIAN NERVE and the muscles which it supplies. (Modified from Pitres and Testut.)

Figure 22.—PRONATOR TERES (Median nerve; C6, **C7**). The patient extends the arm by the side and is resisting the examiner's attempt to supinate the hand. The muscle belly can be felt and sometimes seen.

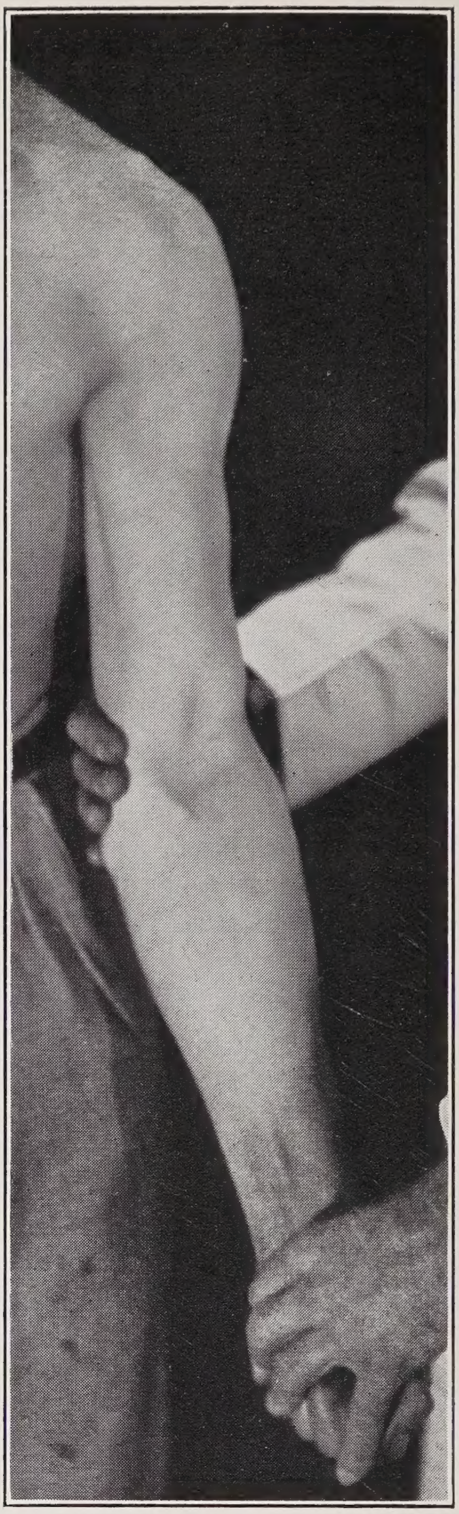
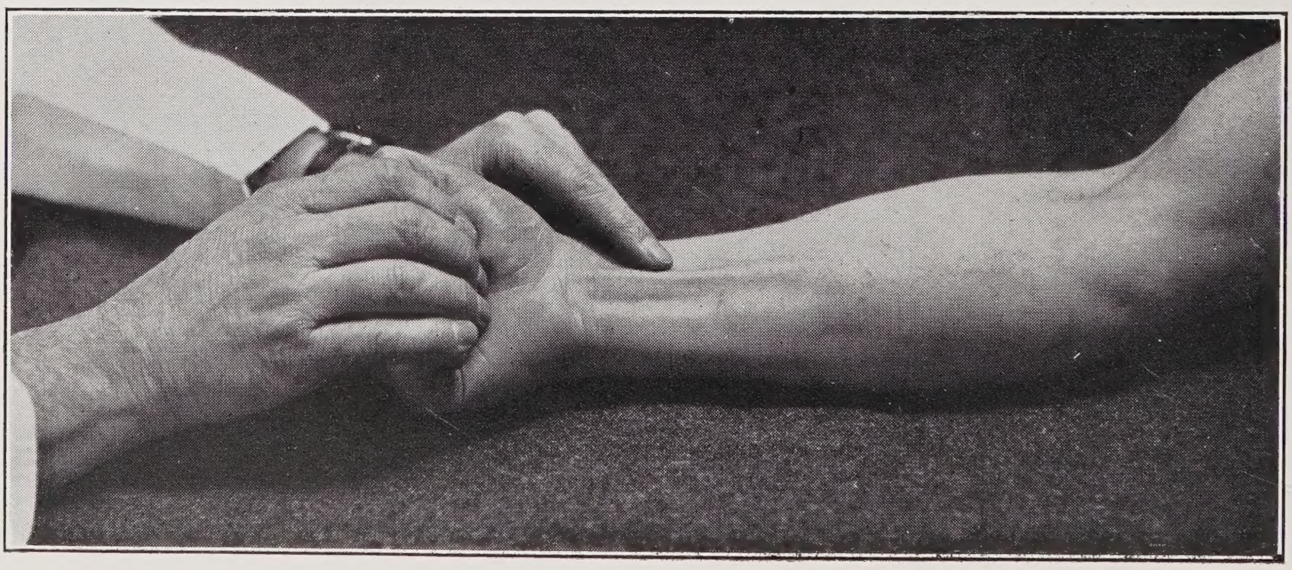


Figure 23.—FLEXOR CARPI RADIALIS (Median nerve; **C7**, C8). The patient is trying to flex the wrist towards the radial side against resistance. The muscle belly can be felt and sometimes seen, and the tendon can be seen.



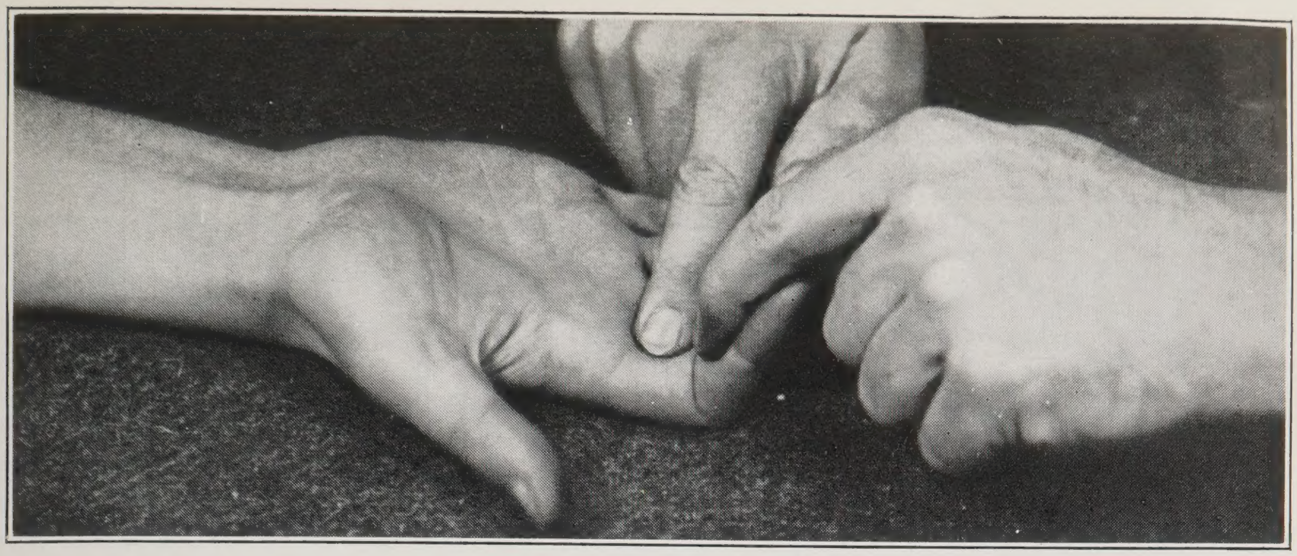


Figure 24.—FLEXOR DIGITORUM SUBLIMIS (Median nerve; C7, **C8, T1**). The patient is resisting an attempt to straighten any finger at its first interphalangeal joint, while the proximal phalanx is fixed. This test does not eliminate the possibility of flexion at the proximal interphalangeal joint being produced by Flexor Digitorum Profundus. The only convincing sign is the ability to flex the proximal joint while the terminal joint remains flaccid.

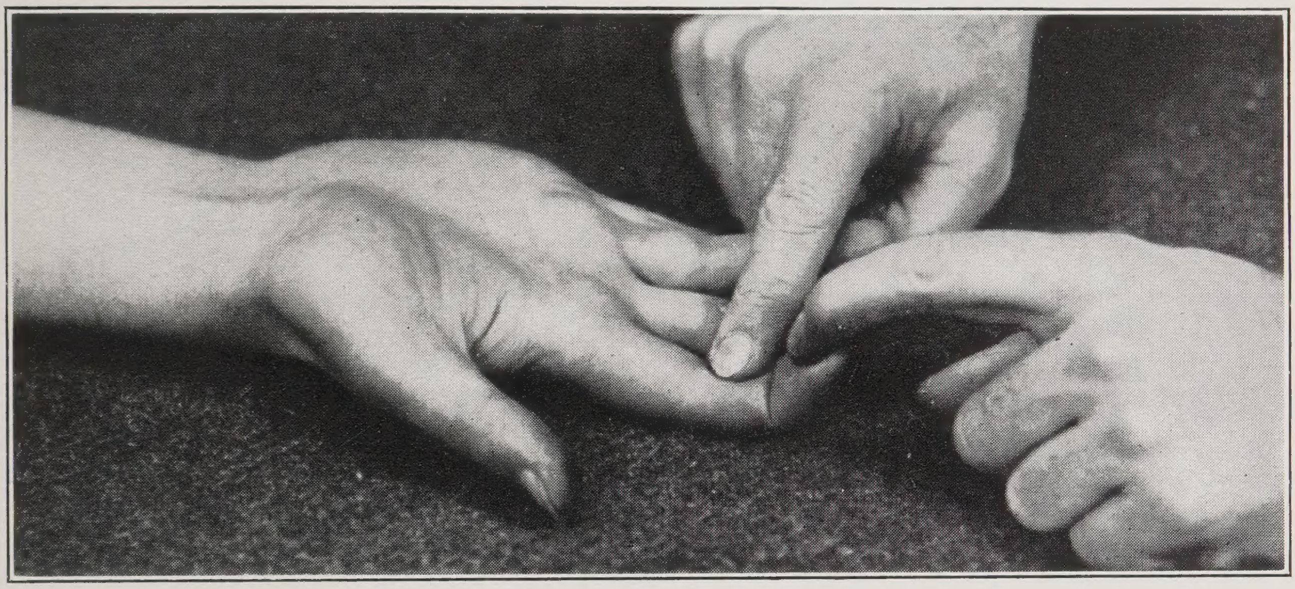


Figure 25.—FLEXOR DIGITORUM PROFUNDUS I and II (Median nerve; **C8, T1**). The patient is resisting an attempt to extend the terminal phalanx of the index finger, while the second phalanx is fixed.

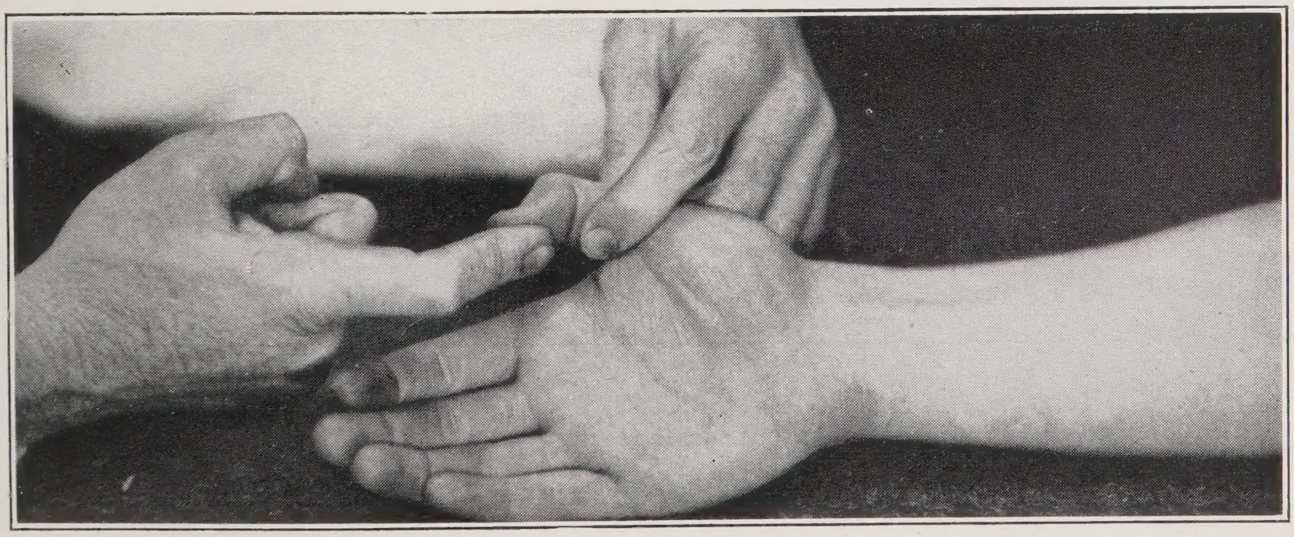


Figure 26.—FLEXOR POLLICIS LONGUS (Median nerve; C8, T1). The patient is resisting an attempt to extend the terminal phalanx of the thumb, while the proximal phalanx is fixed.

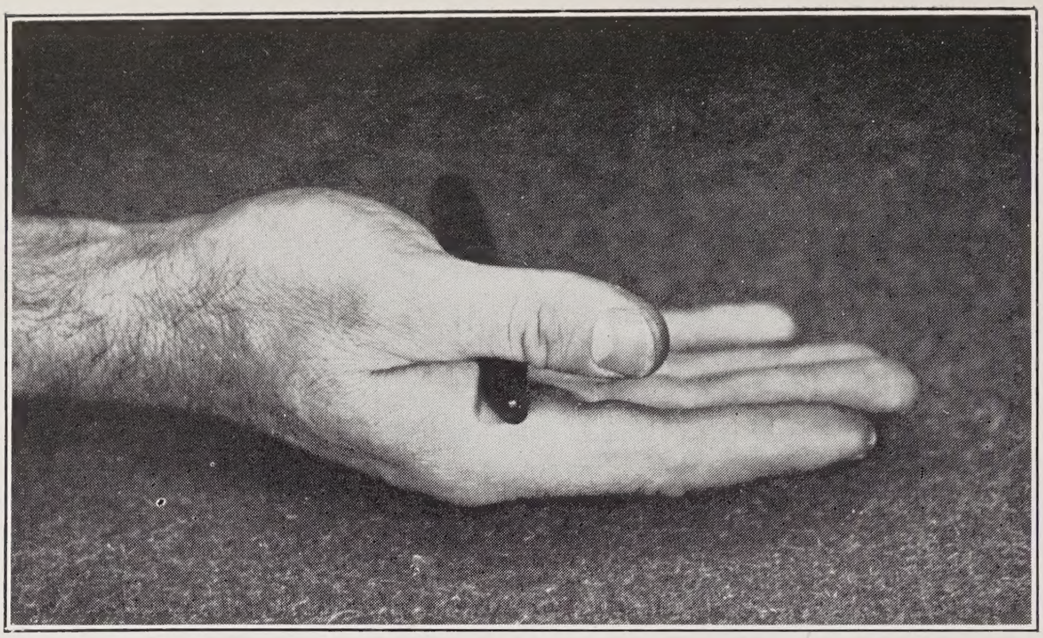


FIGURE 27A.—ABDUCTOR POLLICIS BREVIS (Median nerve; C8, **T1**). *Starting point.* The patient's thumb is placed so that the nail is in a plane at right angles to the palm of the hand, with a fountain pen, or other similar object, between thumb and palm.

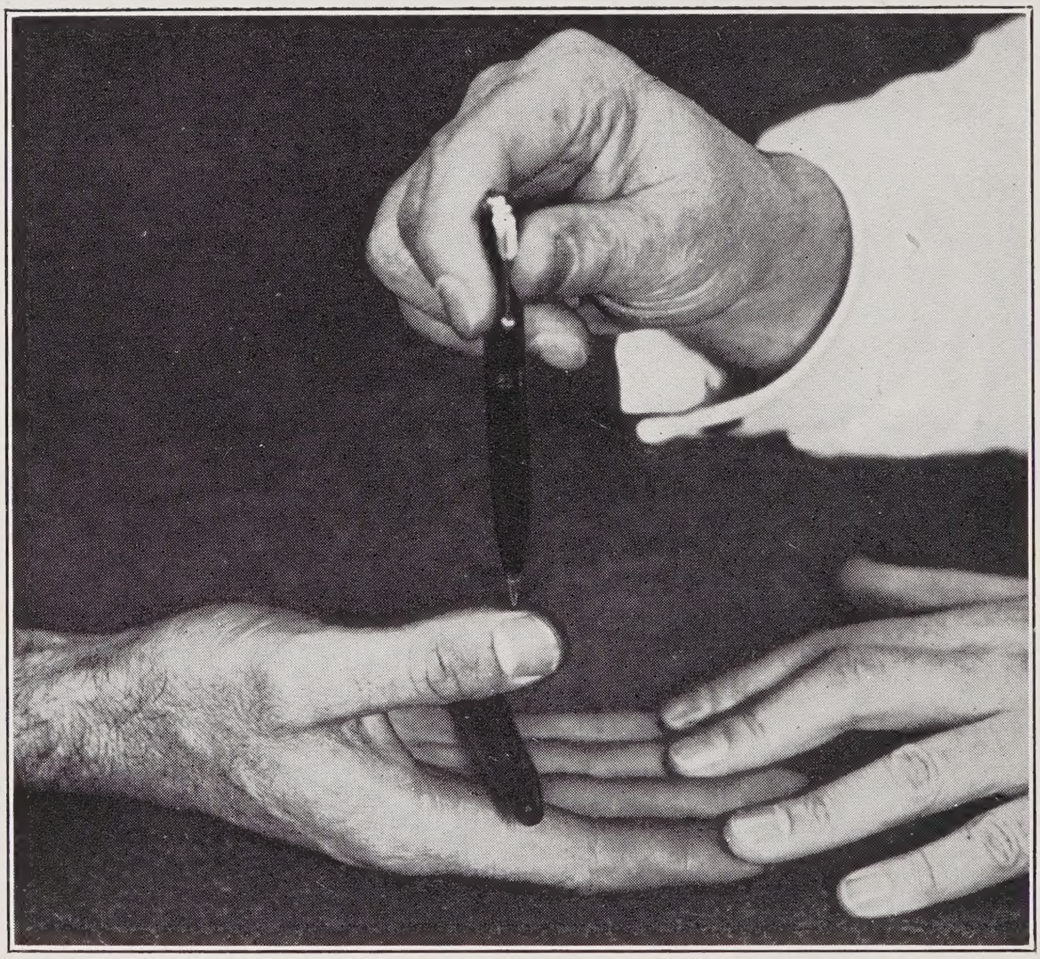


FIGURE 27B.—ABDUCTOR POLLICIS BREVIS (Median nerve; C8, **T1**). *Test.* The patient is trying against resistance to bring the edge of his thumb to a point vertically above its original position. Note that the nail maintains its position in a plane at right angles to the palm.

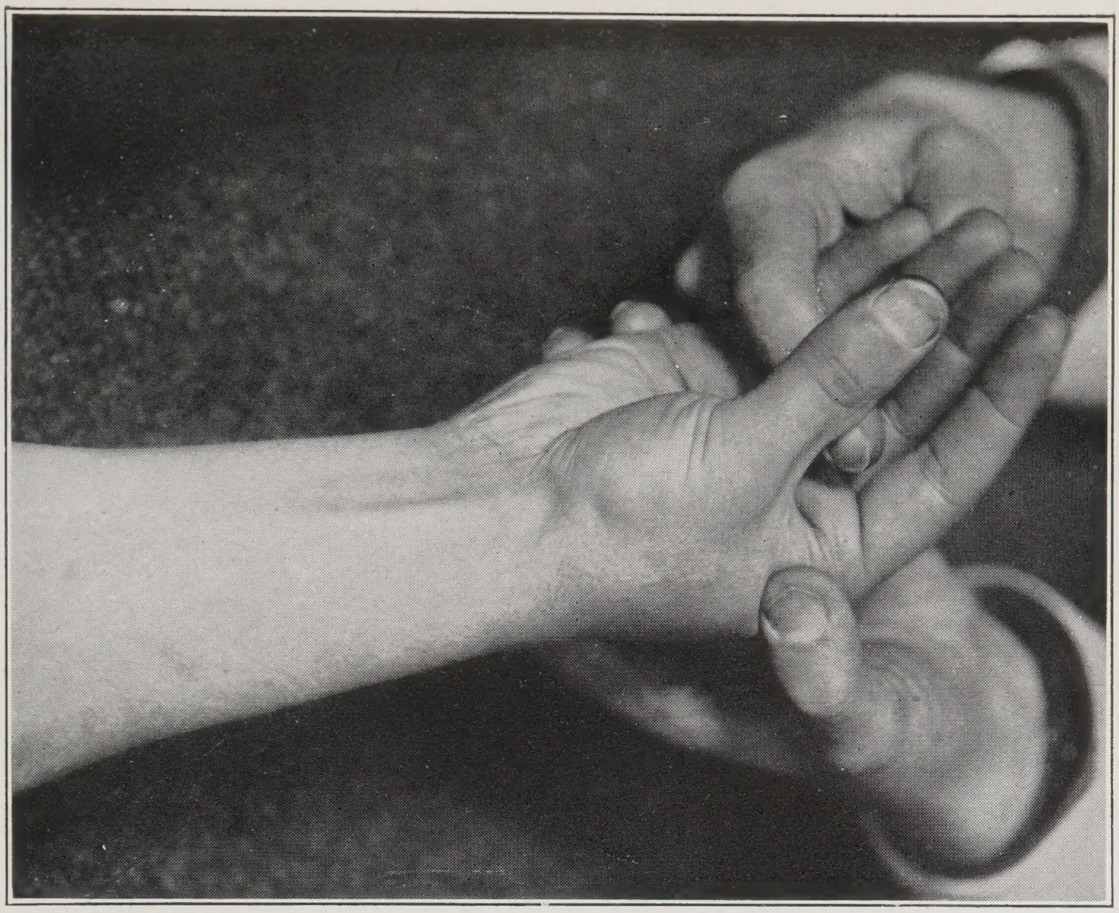


Figure 28.—OPPONENS POLLICIS (Median nerve; C8, **T1**). The patient is trying against resistance to touch the tip of the little finger with the thumb, while the thumb nail remains in a plane parallel to the palm.

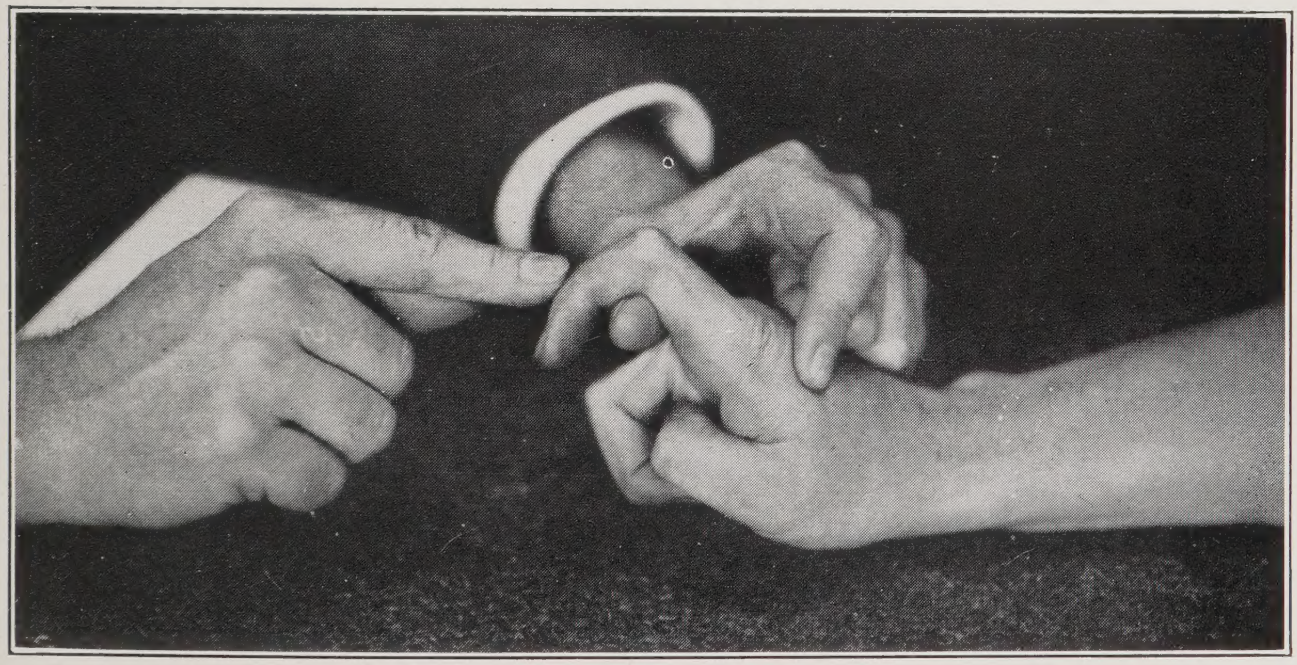
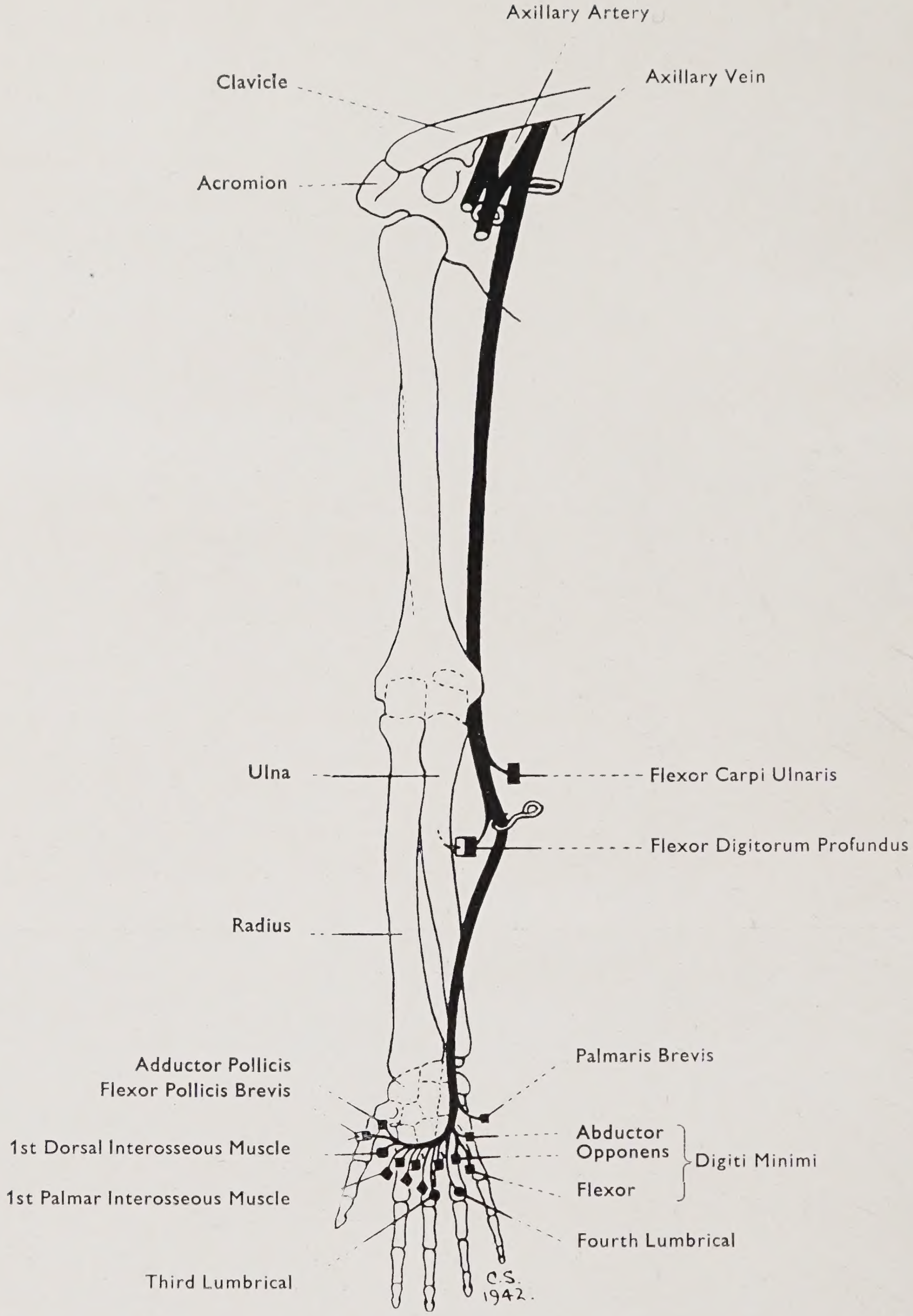


Figure 29.—LUMBRICAL-INTEROSSEOUS MUSCLE (1st) (Median and ulnar nerves; C8, **T1**). With the metacarpo-phalangeal joint hyperextended and fixed, the patient is trying to extend the first interphalangeal joint against resistance. The belly of the first dorsal interosseous muscle can be seen and felt.


Axillary Artery
Clavicle
Axillary Vein
Acromion
Ulna
Flexor Carpi Ulnaris
Flexor Digitorum Profundus
Radius
Adductor Pollicis
Flexor Pollicis Brevis
Palmaris Brevis
1st Dorsal Interosseous Muscle
Abductor
Opponens
Digiti Minimi
Flexor
1st Palmar Interosseous Muscle
Fourth Lumbrical
Third Lumbrical
C.S. 1942.

V. Diagram of the ULNAR NERVE and the muscles which it supplies. (Modified from Pitres and Testut.)

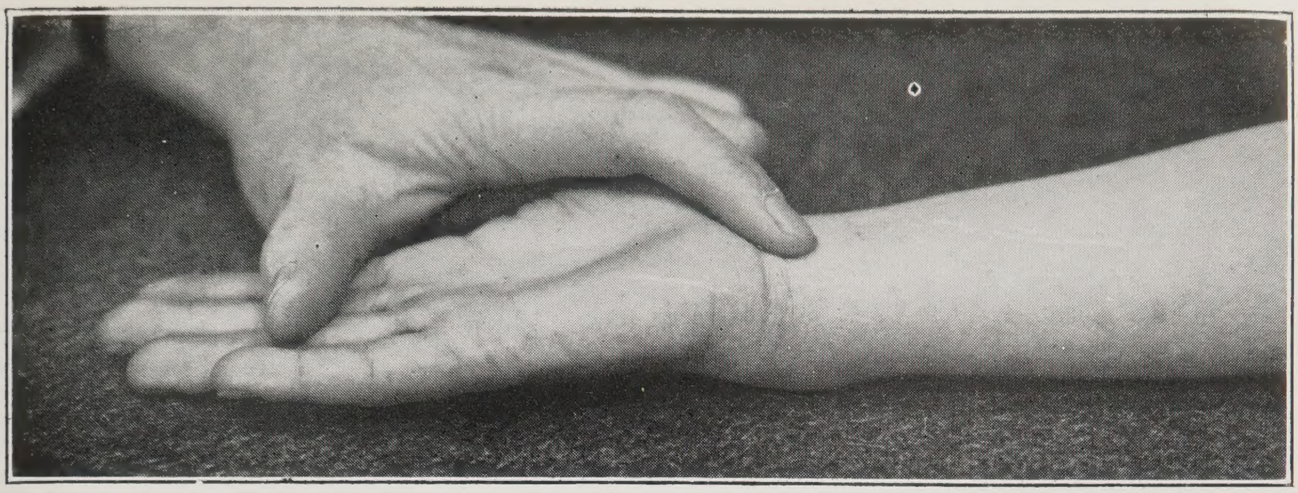


FIGURE 30A.—FLEXOR CARPI ULNARIS (Ulnar nerve; **C7,** C8). The patient lays the hand palm upwards on the table, the fingers being extended.

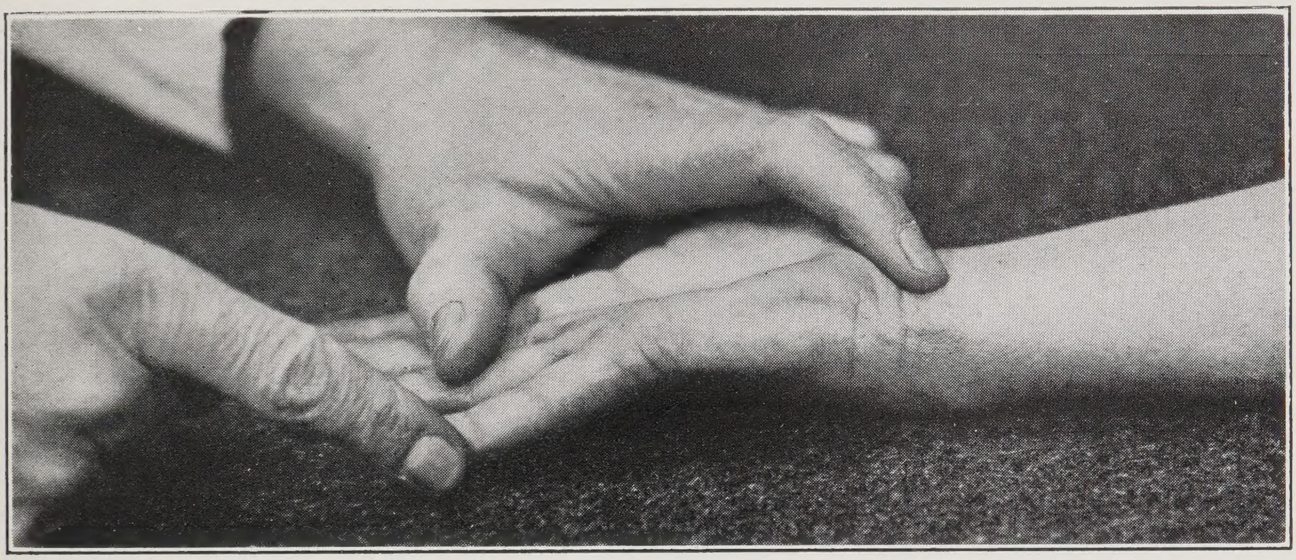


FIGURE 30B.—FLEXOR CARPI ULNARIS (Ulnar nerve; **C7,** C8). The patient is trying to abduct the little finger strongly. The tendon of flexor carpi ulnaris can be seen and felt as the muscle comes into action to fix the point of origin of abductor digiti minimi. When flexor carpi ulnaris is intact, this movement is observed even when abductor digiti minimi is paralysed.

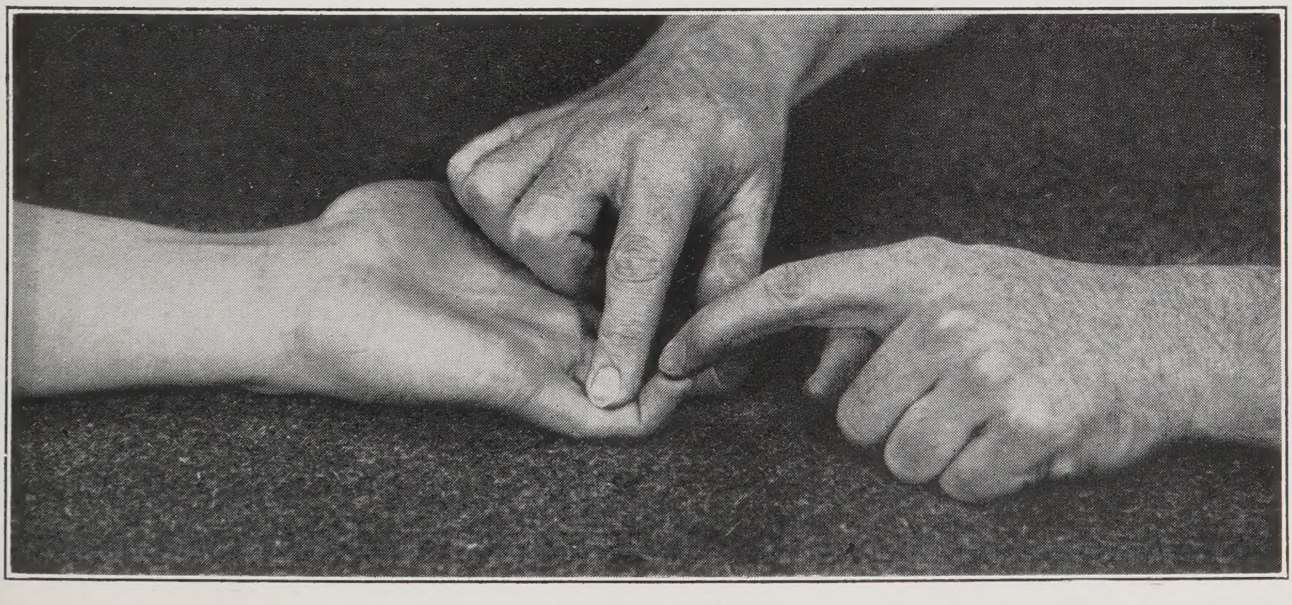


FIGURE 31.—FLEXOR DIGITORUM PROFUNDUS III AND IV (Ulnar nerve; C8, T1). The patient is resisting an attempt to extend the little finger at the distal interphalangeal joint, while the middle phalanx is fixed.

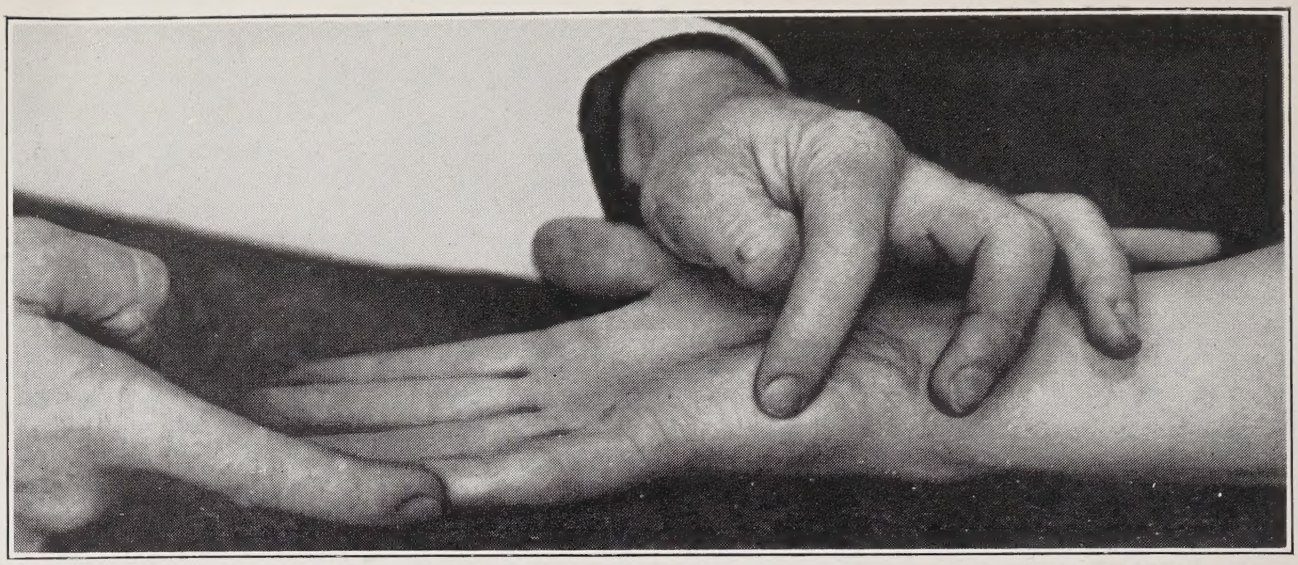


FIGURE 32.—ABDUCTOR DIGITI MINIMI (Ulnar nerve; C8, **T1**). With the back of the hand and the fingers flat upon a table, the patient is trying against resistance to abduct the little finger. The muscle belly can be felt and usually seen.

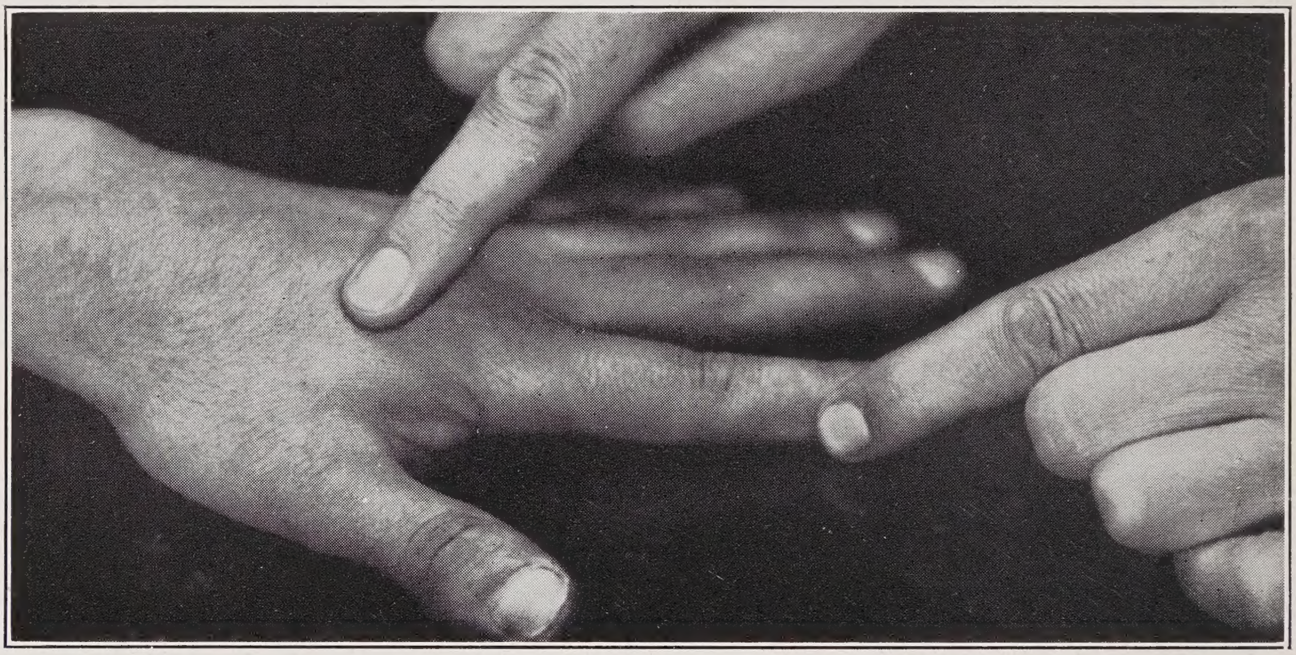


FIGURE 33.—FIRST DORSAL INTEROSSEOUS MUSCLE (Ulnar nerve; C8, **T1**). With the fingers and palm flat upon a table, the patient is trying against resistance to abduct the index finger. The muscle belly can be felt and usually seen.

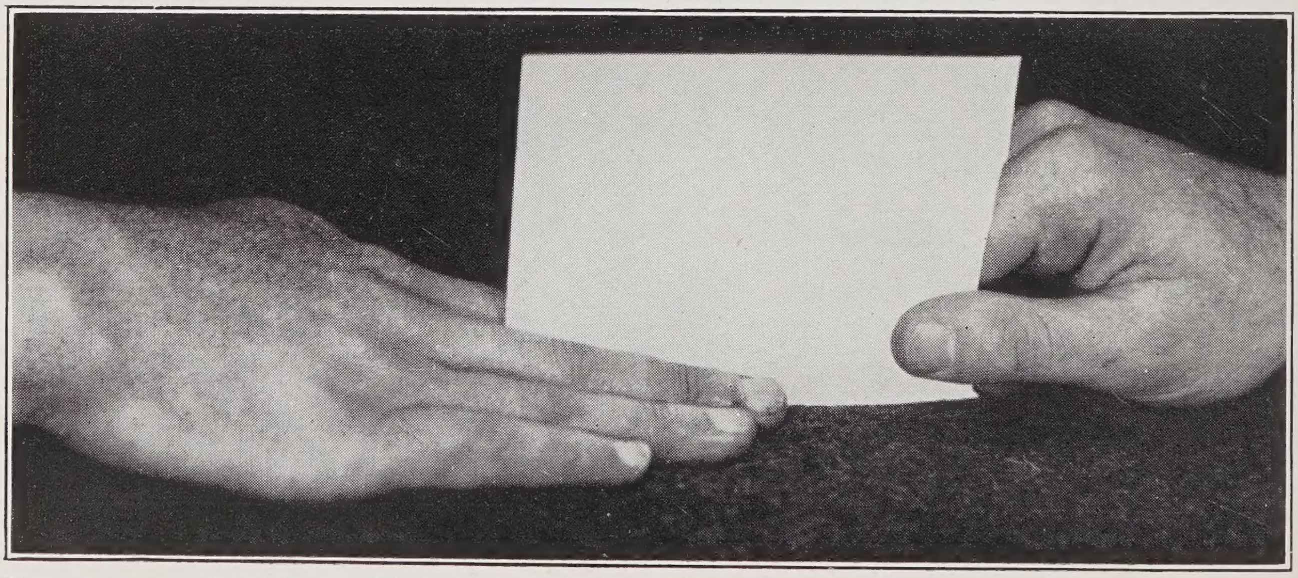


FIGURE 34.—FIRST PALMAR INTEROSSEOUS MUSCLE. (Ulnar nerve; C8, **T1**). With the fingers and palm flat upon a table, the patient is trying against resistance to retain a piece of paper between the index and middle fingers.

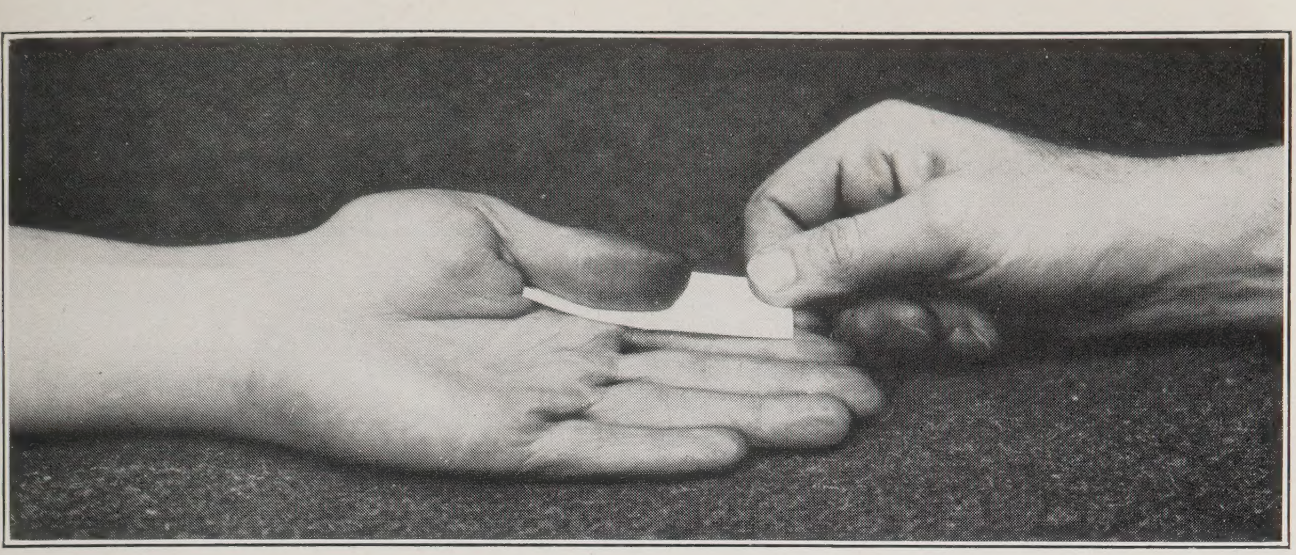


Figure 35.—ADDUCTOR POLLICIS (Ulnar nerve; C8, **T1**). With the thumb lying along the palmar aspect of the index finger, and its nail in a plane at right angles to the palm, the patient is trying against resistance to retain a strip of paper between the thumb and the palm.

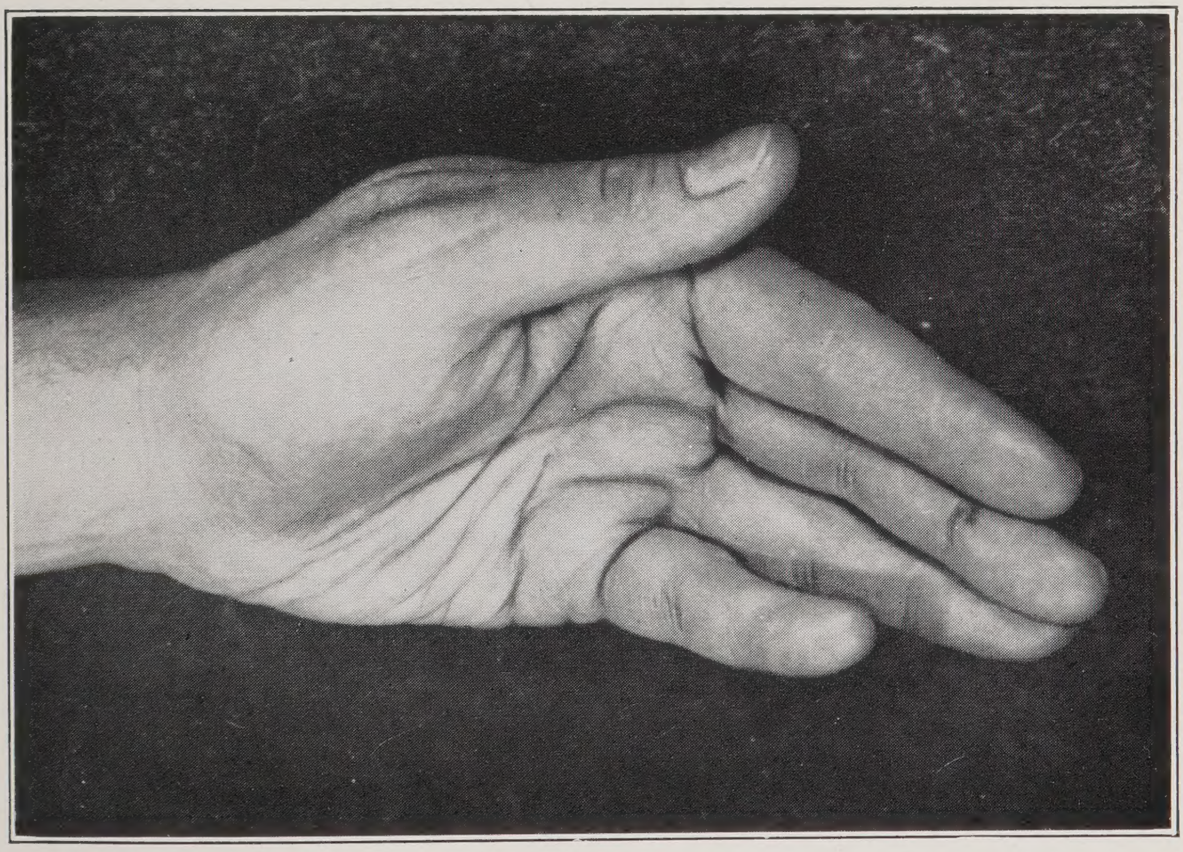
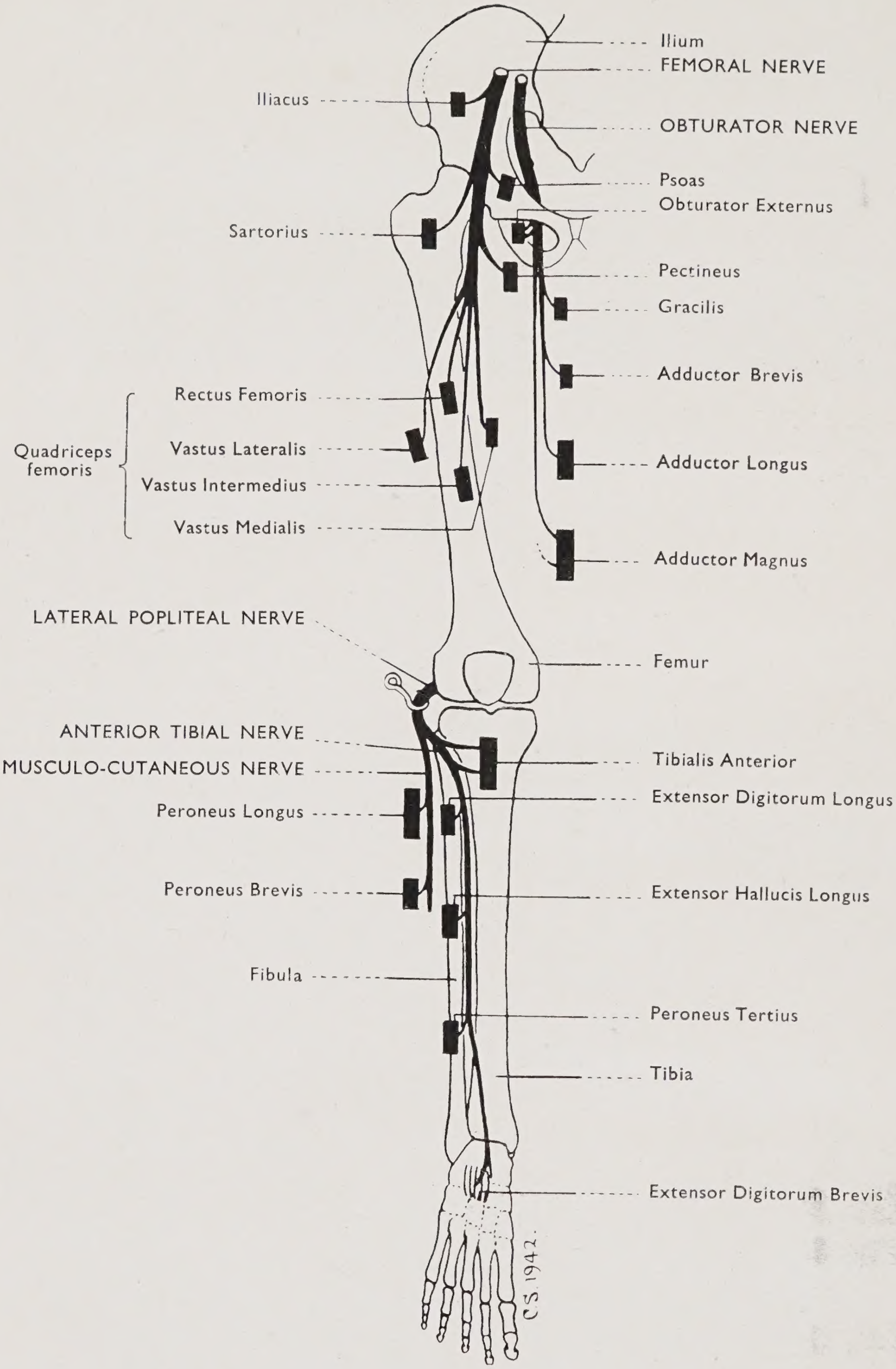
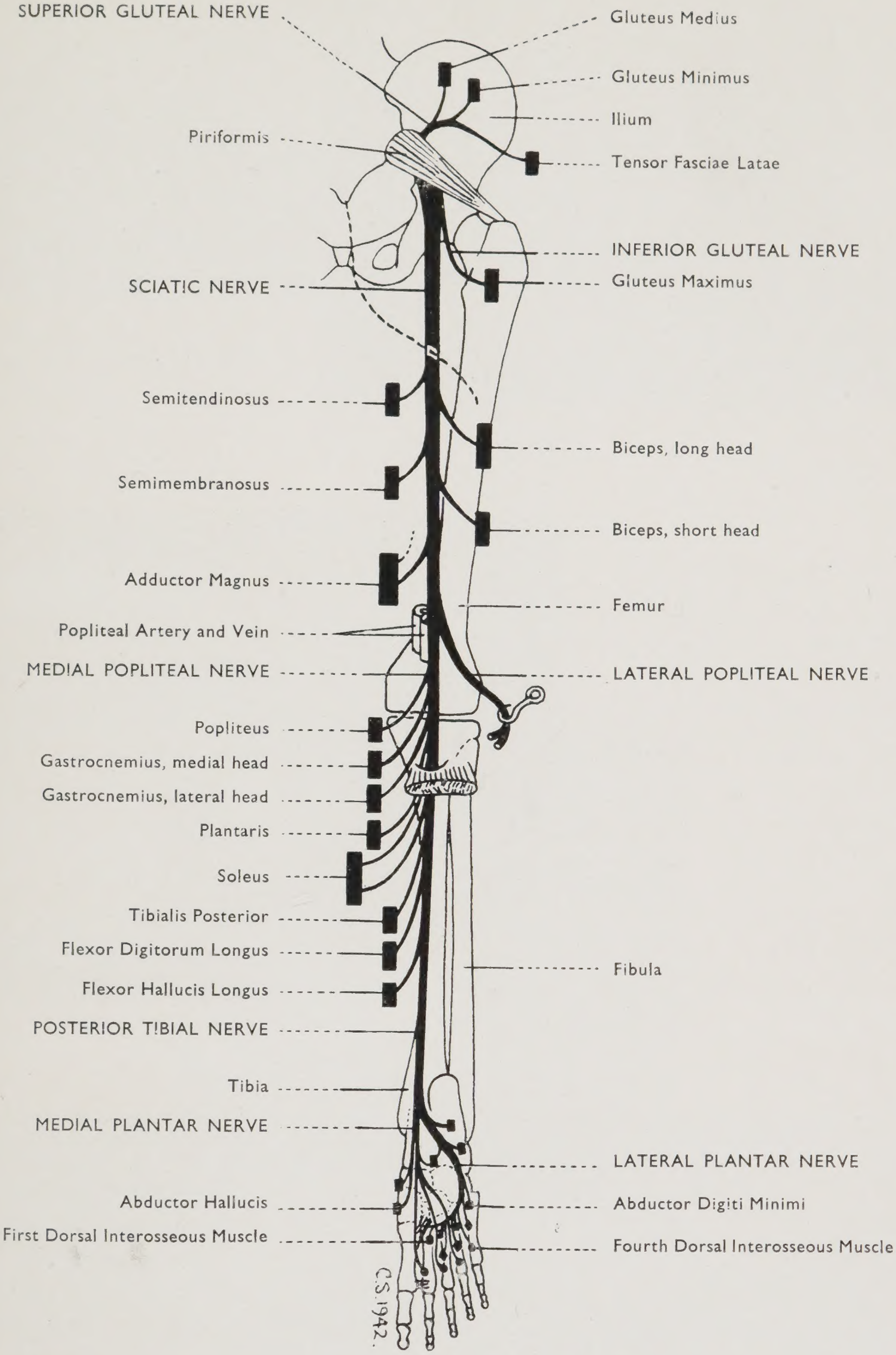


Figure 36.—OPPONENS DIGITI MINIMI (Ulnar nerve; C8, **T1**). With the fingers extended, the patient is trying to make a cup of the palm and to carry the fifth finger in front of the others.


Ilium
FEMORAL NERVE
Iliacus
OBTURATOR NERVE
Psoas
Obturator Externus
Sartorius
Pectineus
Gracilis
Adductor Brevis
Rectus Femoris
Quadriceps femoris
Vastus Lateralis
Adductor Longus
Vastus Intermedius
Vastus Medialis
Adductor Magnus
LATERAL POPLITEAL NERVE
Femur
ANTERIOR TIBIAL NERVE
Tibialis Anterior
MUSCULO-CUTANEOUS NERVE
Extensor Digitorum Longus
Peroneus Longus
Peroneus Brevis
Extensor Hallucis Longus
Fibula
Peroneus Tertius
Tibia
Extensor Digitorum Brevis
C.S. 1942.

VI. Diagram of the NERVES on the ANTERIOR ASPECT of the LOWER LIMB, and the muscles which they supply. (Modified from Pitres and Testut.)


SUPERIOR GLUTEAL NERVE
Gluteus Medius
Gluteus Minimus
Ilium
Piriformis
Tensor Fasciae Latae
INFERIOR GLUTEAL NERVE
SCIATIC NERVE
Gluteus Maximus
Semitendinosus
Biceps, long head
Semimembranosus
Biceps, short head
Adductor Magnus
Femur
Popliteal Artery and Vein
MEDIAL POPLITEAL NERVE
LATERAL POPLITEAL NERVE
Popliteus
Gastrocnemius, medial head
Gastrocnemius, lateral head
Plantaris
Soleus
Tibialis Posterior
Flexor Digitorum Longus
Fibula
Flexor Hallucis Longus
POSTERIOR TIBIAL NERVE
Tibia
MEDIAL PLANTAR NERVE
LATERAL PLANTAR NERVE
Abductor Hallucis
Abductor Digiti Minimi
First Dorsal Interosseous Muscle
Fourth Dorsal Interosseous Muscle
C.S. 1942.

VII. Diagram of the NERVES on the POSTERIOR ASPECT of the LOWER LIMB, and the muscles which they supply. (Modified from Pitres and Testut.)

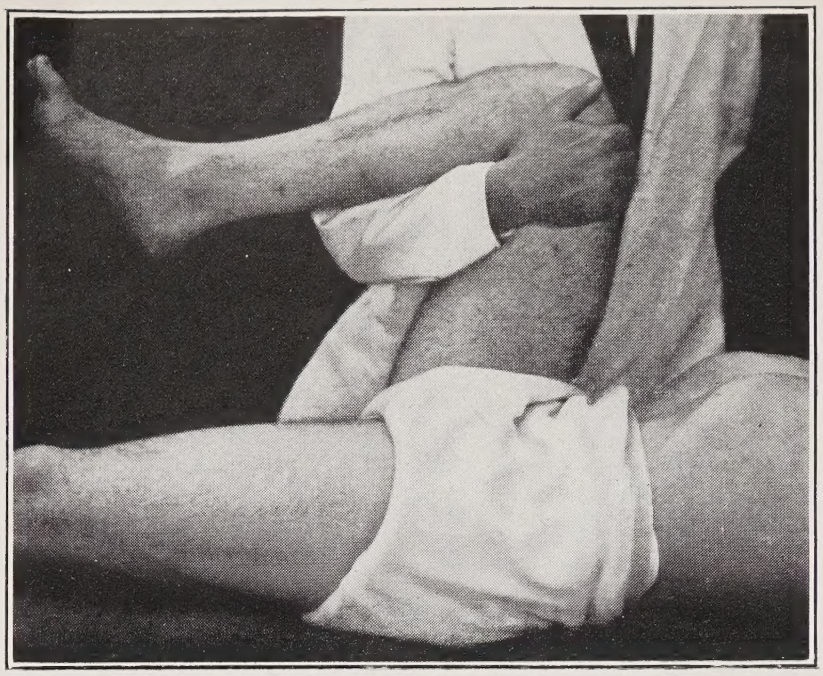
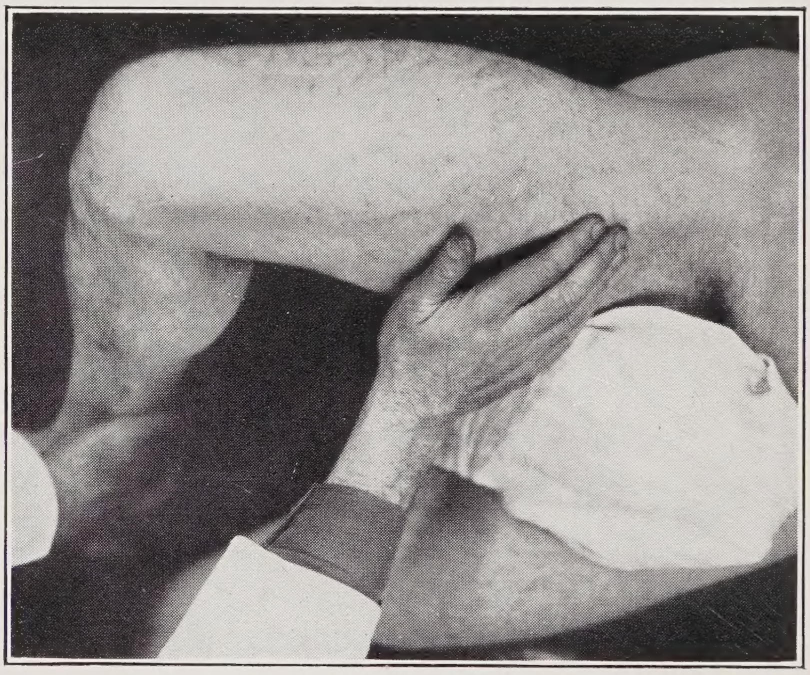


FIGURE 37.—ILIO-PSOAS (Femoral nerve, and L1; **L1, L2,** L3, L4). The knee is flexed and the leg supported by the examiner. The limb is brought to a position in which the angle between the trunk and thigh is just less than a right angle. The patient is trying to flex the hip joint against resistance.

FIGURE 38.—SARTORIUS (Femoral nerve; **L2,** L3, L4). The patient lies on the back with the hip laterally rotated, and is trying to flex the knee against resistance. The muscle belly can be felt and sometimes seen.



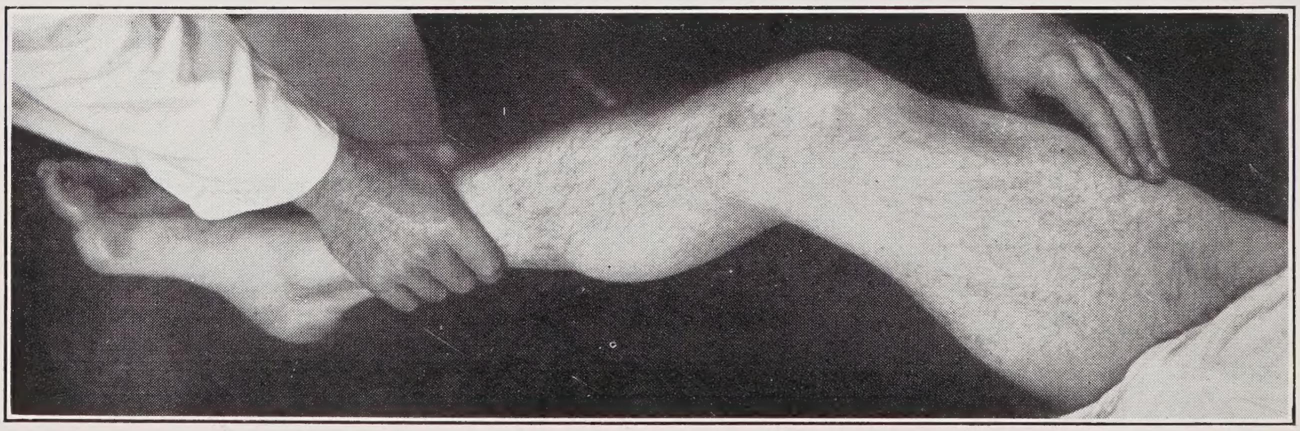


FIGURE 39.—QUADRICEPS FEMORIS (Femoral nerve; L2, **L3, L4**). The patient is trying to extend the knee against resistance. The muscle bellies can be felt and often seen.

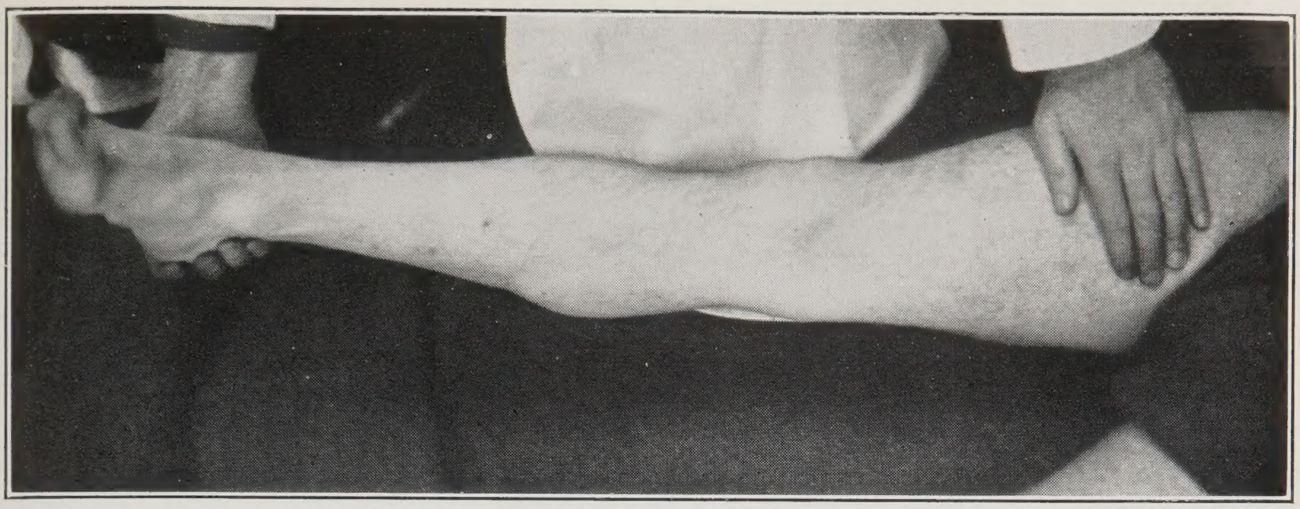


Figure 40.—ADDUCTORS (Obturator nerve; **L2, L3,** L4). The patient lies on the back with the knee extended, and is trying to adduct the limb against resistance. The muscle bellies can be felt.

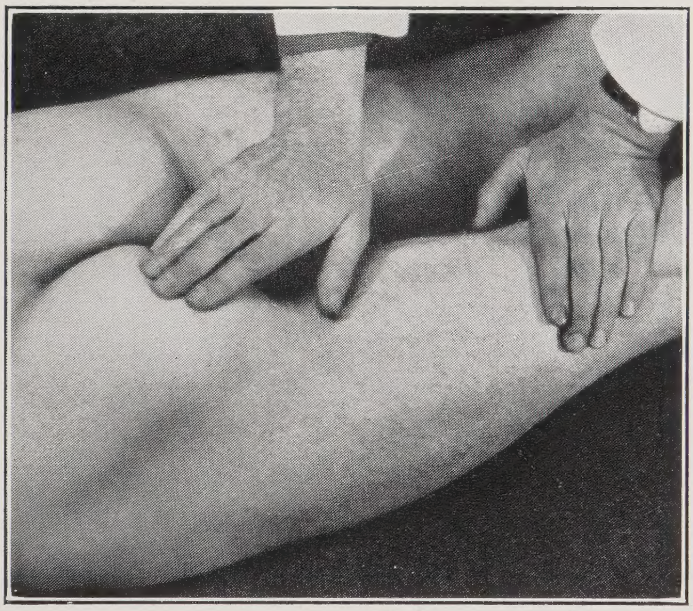


Figure 41.—GLUTEUS MAXIMUS (Inferior gluteal nerve; L5, **S1**, S2). The patient lies on the face and is trying against resistance to lift the knee off the couch. The muscle belly can be felt and often seen.

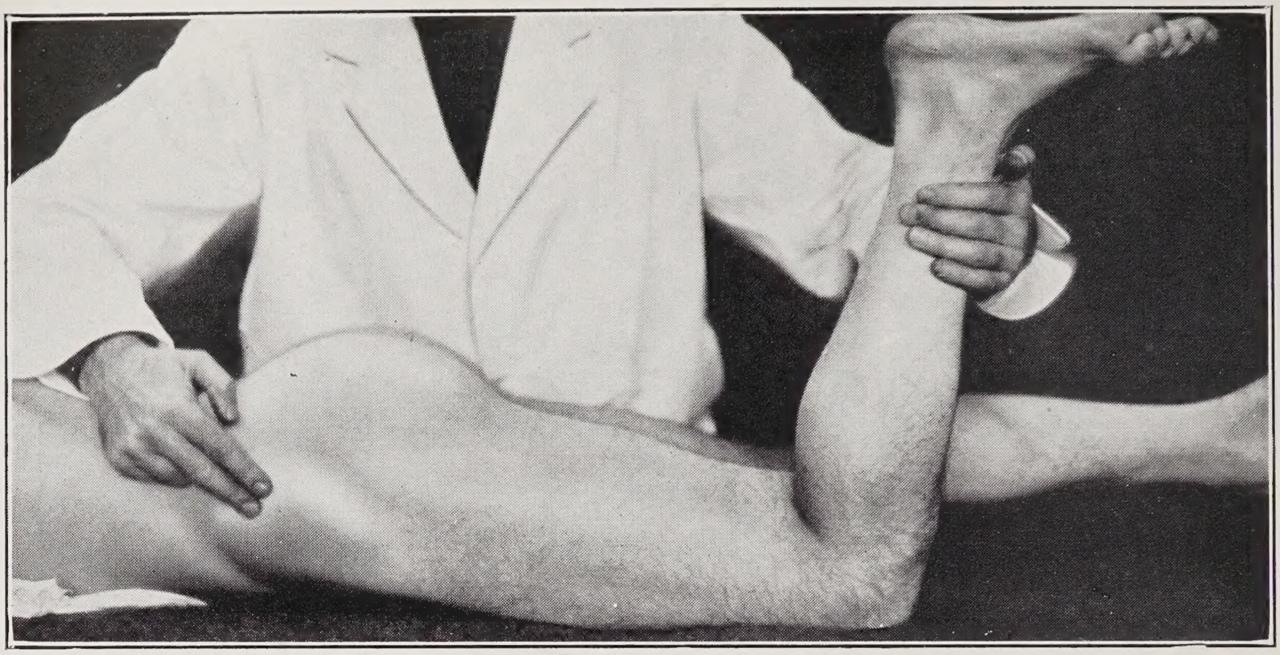


Figure 42A.—GLUTEUS MEDIUS AND MINIMUS, and TENSOR FASCIAE LATAE (Superior gluteal nerve; **L4,** L5). To test internal rotation at the hip joint. The patient lies on the face with the knee flexed to a right angle, and is trying to carry the foot laterally against resistance. The muscle bellies can be felt and sometimes seen.

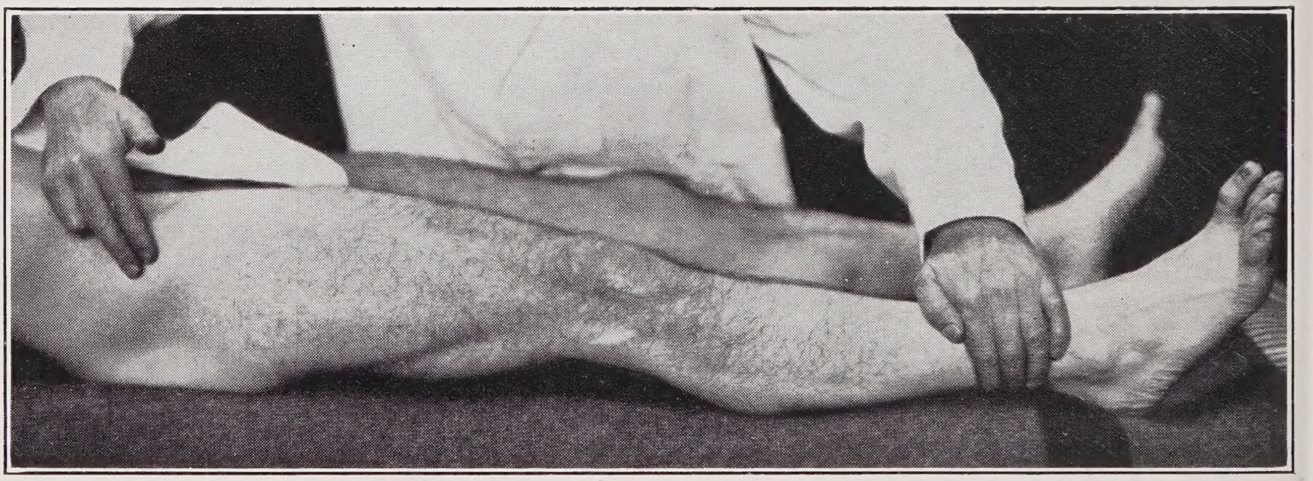


Figure 42B.—GLUTEUS MEDIUS AND MINIMUS, and TENSOR FASCIAE LATAE (Superior gluteal nerve; **L4,** L5). To test abduction. The patient lies on the back with the leg extended, and is trying to abduct the limb against resistance. The muscle bellies can be felt and sometimes seen.

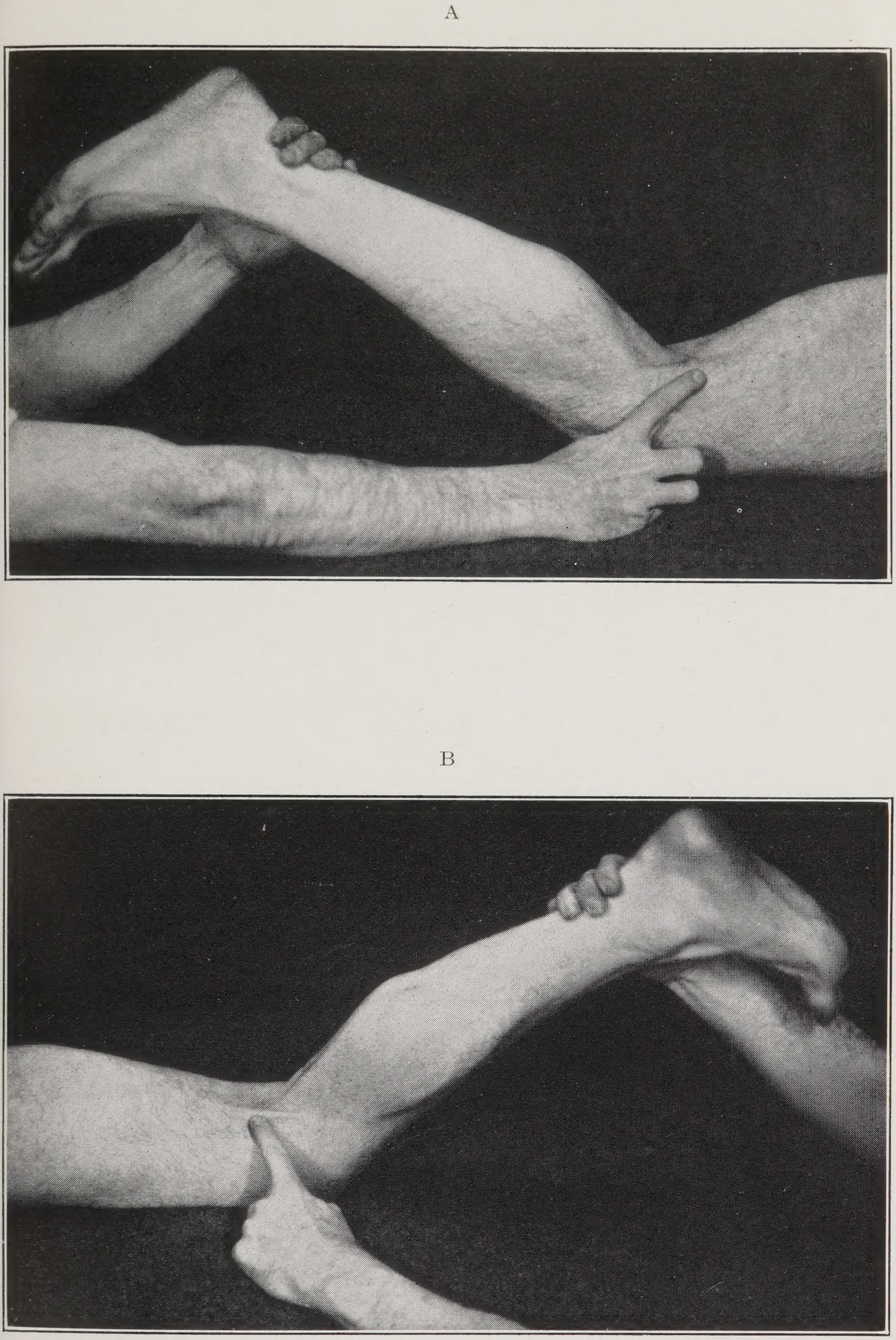


FIGURE 43 (A and B).—HAMSTRING MUSCLES (Sciatic nerve; L5, **S1, S2**). The patient lies on the face and is trying to flex the knee against resistance. (A) The tendons of the biceps (laterally), and (B) semitendinosus (medially) can be felt and usually seen.

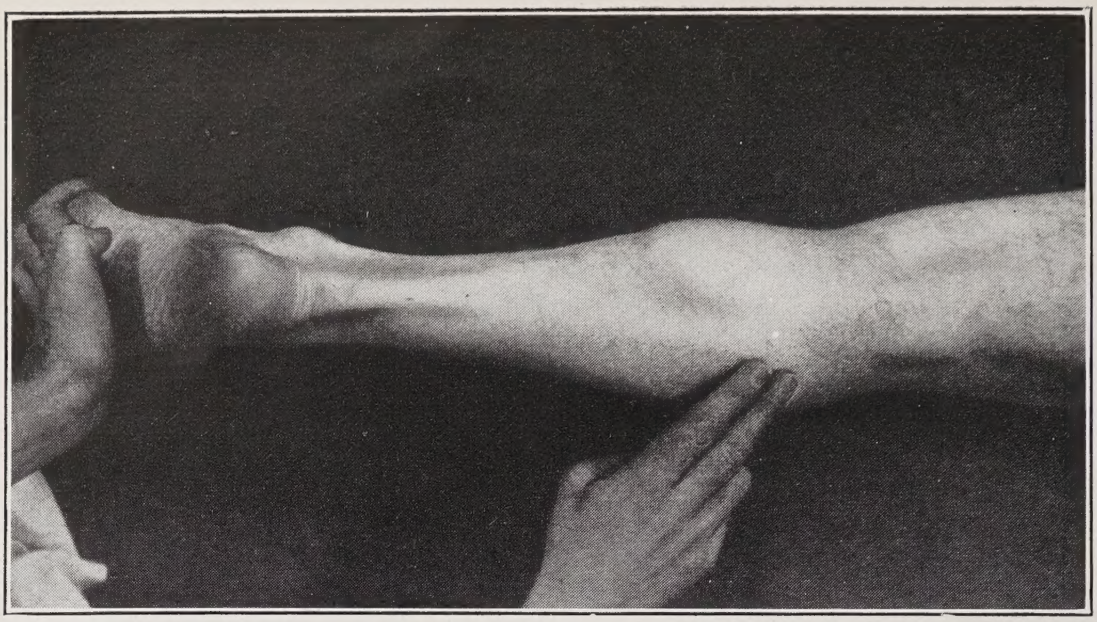


FIGURE 44.—GASTROCNEMIUS (Sciatic nerve; S1, **S2**). The patient lies on the face and is trying to plantar-flex the ankle joint against resistance. The muscle belly can be seen and felt.

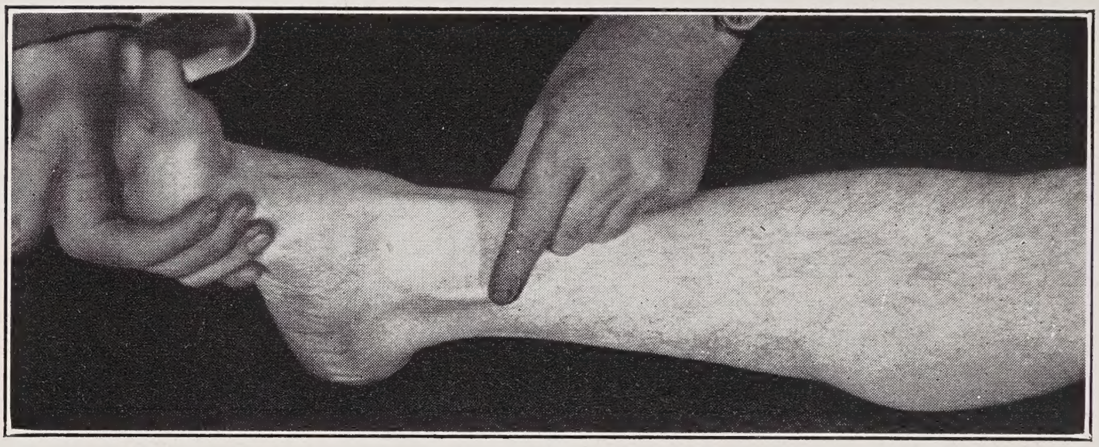


FIGURE 45.—TIBIALIS POSTERIOR (Sciatic nerve; **L4,** L5). The patient lies on the back and is trying to invert the foot against resistance. The tendon can be seen and felt.

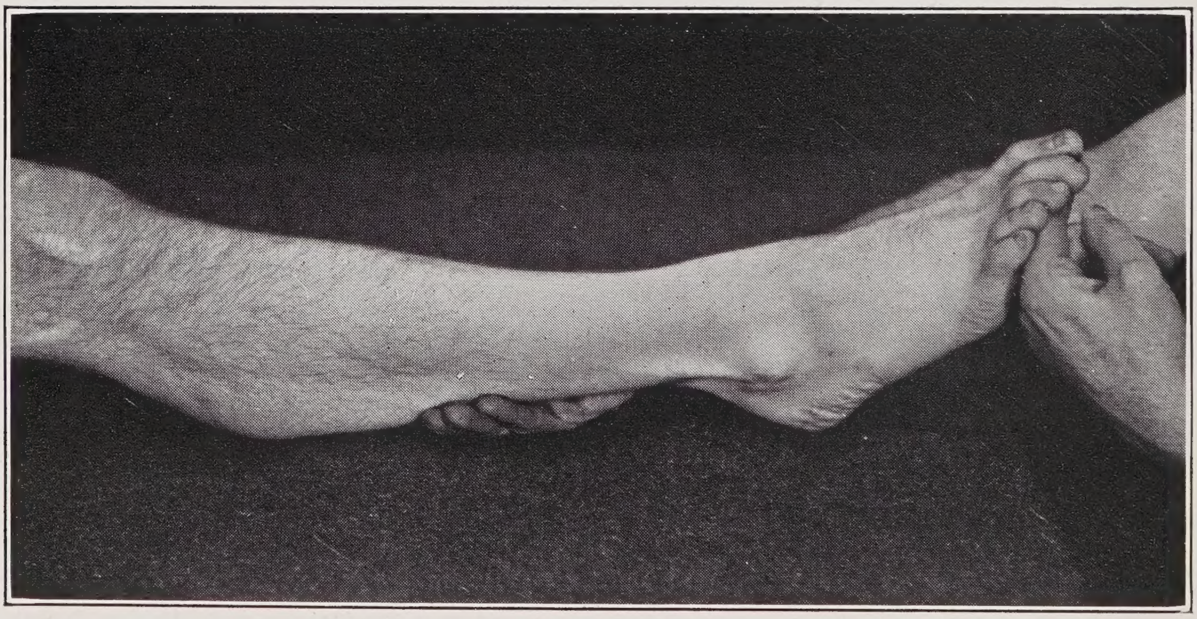


FIGURE 46.—FLEXOR DIGITORUM LONGUS. FLEXOR HALLUCIS LONGUS (Sciatic nerve; S1, **S2**). The patient is trying to flex the toes against resistance. The muscle bellies can be felt.

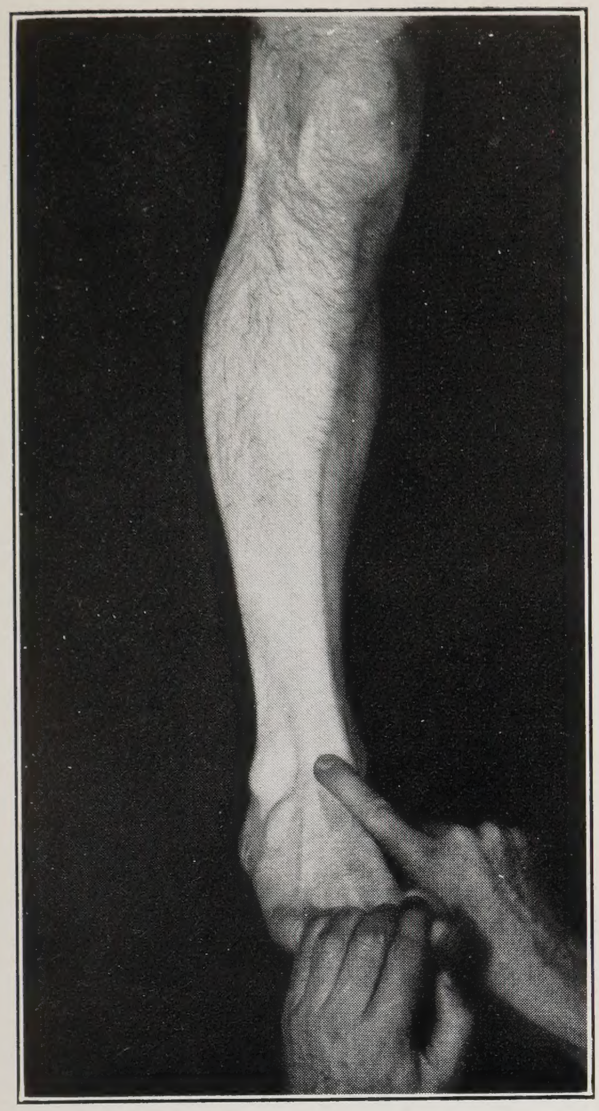


Figure 47.—TIBIALIS ANTERIOR (Sciatic nerve; **L4,** L5). The patient is trying to dorsiflex the ankle against resistance. The muscle belly and its tendon can be seen and felt.

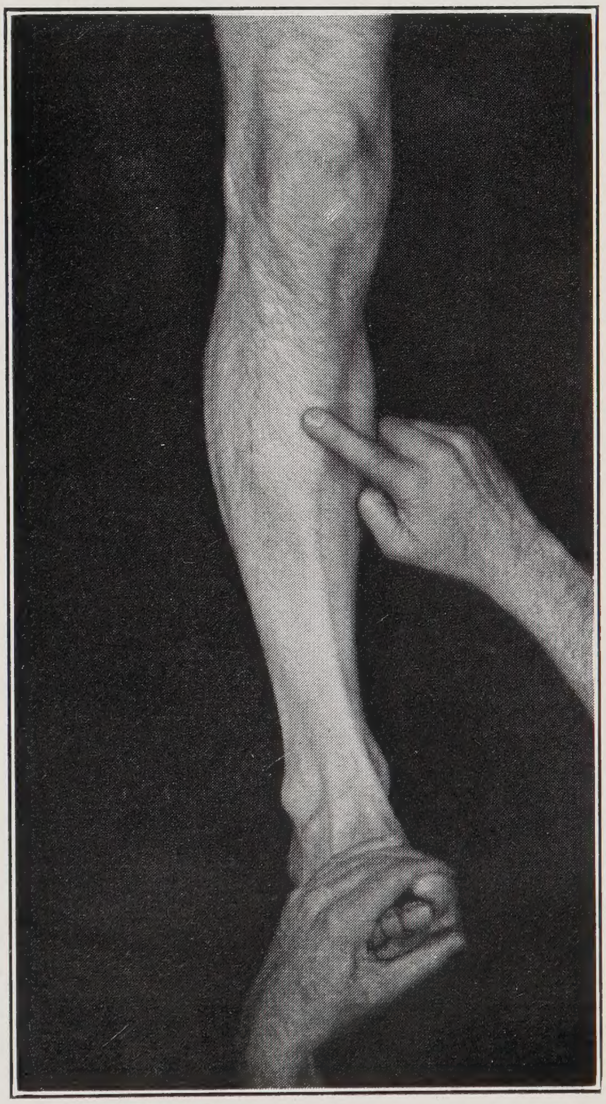


Figure 48.—EXTENSOR DIGITORUM LONGUS (Sciatic nerve; L5, S1). The patient is trying to dorsiflex the toes against resistance. The tendons passing to the outer four toes can be seen and felt.

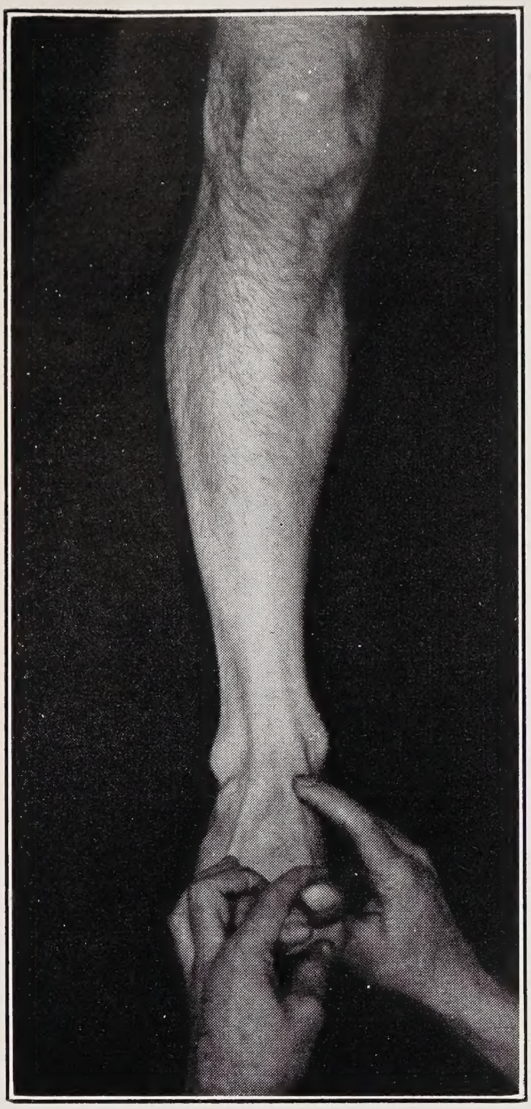


Figure 49.—EXTENSOR HALLUCIS LONGUS (Sciatic nerve; L5, S1). The patient is trying to dorsiflex the great toe against resistance. The tendon can be seen and felt.

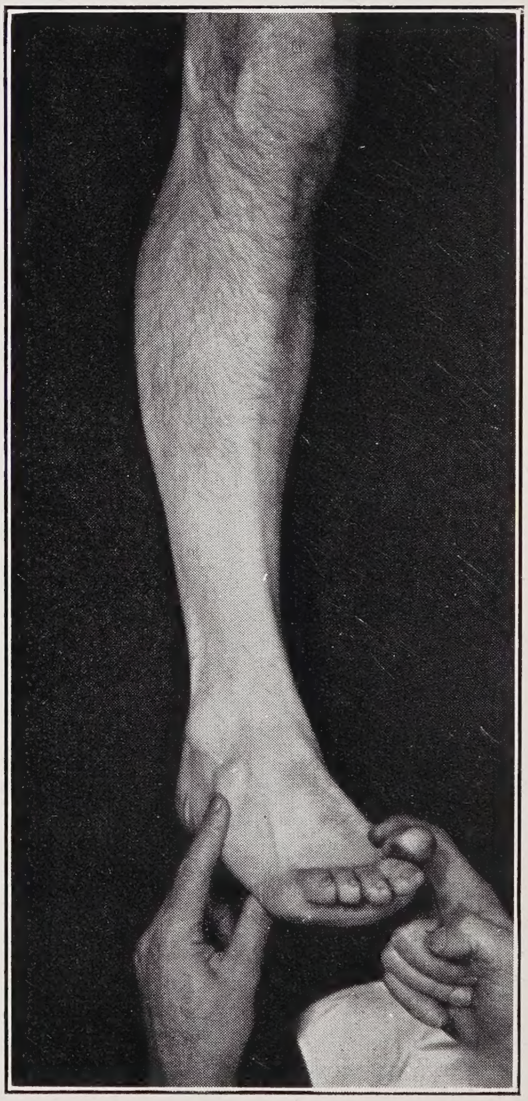


Figure 50.—EXTENSOR DIGITORUM BREVIS (Sciatic nerve; S1, S2). The patient is trying to dorsiflex the great toe against resistance. The muscle belly can be felt and often seen.

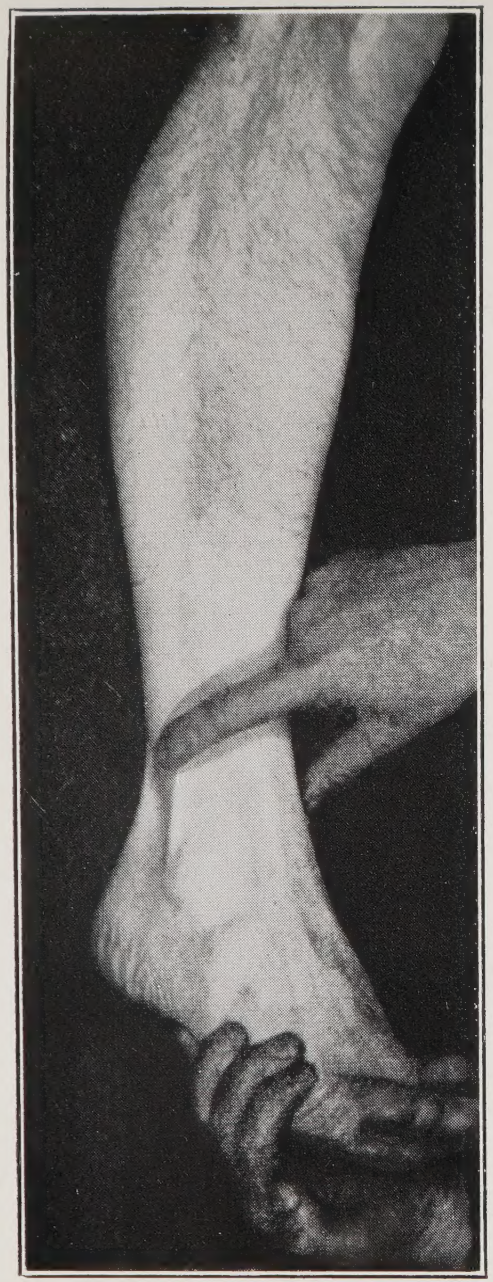


FIGURE 51.—PERONEUS LONGUS AND BREVIS (Sciatic nerve; **L5, S1,** S2). The patient is trying to evert the foot against resistance. The tendons can be felt and usually seen.

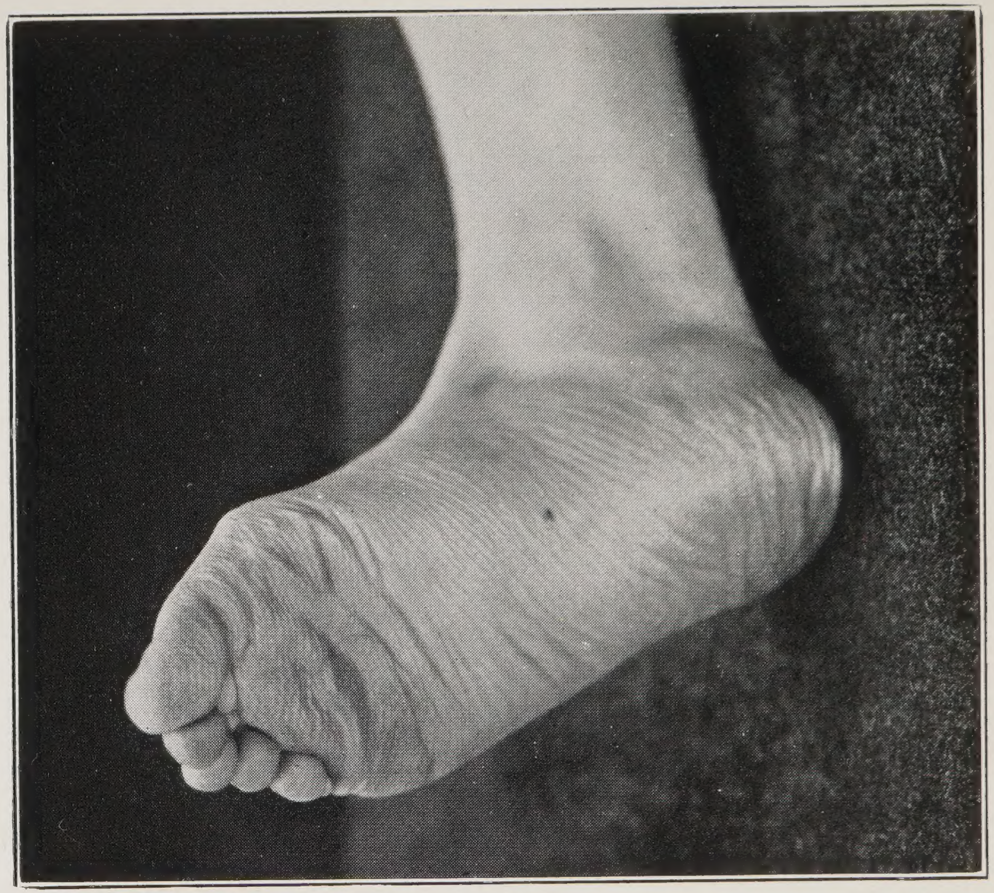
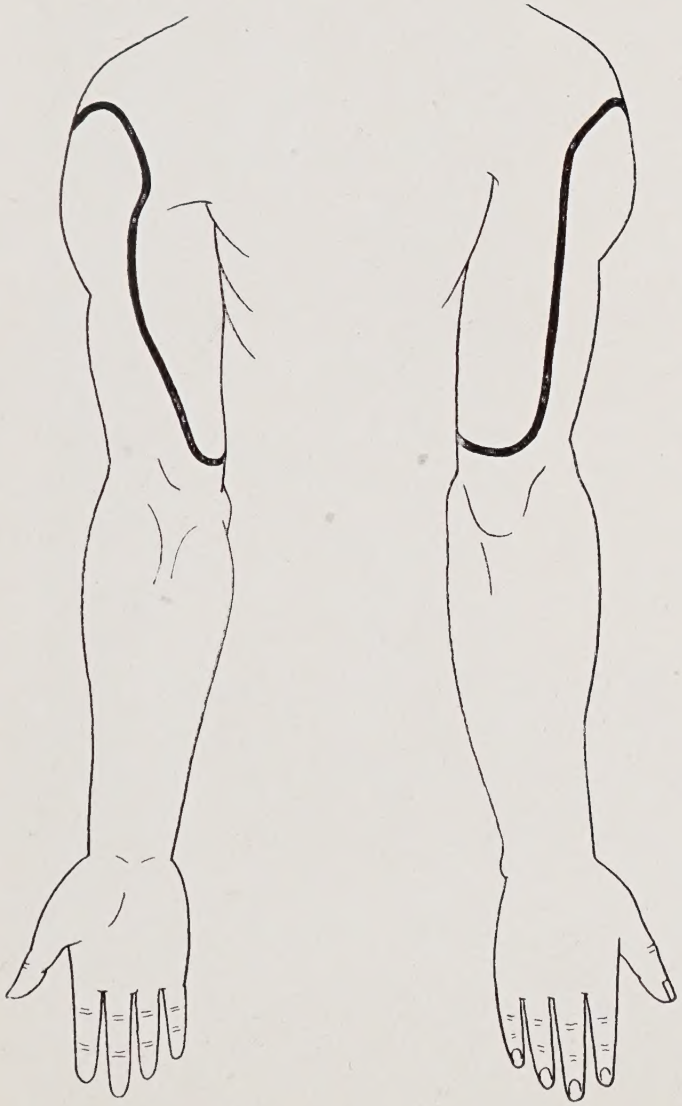


FIGURE 52.—SMALL MUSCLES OF FOOT (Sciatic nerve; S1, **S2**). The patient is trying to make a cup of the sole of the foot.



(*Left*) FIGURE 53.—The approximate area within which sensory changes may be found in complete lesions of the BRACHIAL PLEXUS (C5, C6, C7, C8, T1).

(*Right*) FIGURE 54.—The approximate area within which sensory changes may be found in lesions of the LOWER ROOTS (C8, T1) of the BRACHIAL PLEXUS.

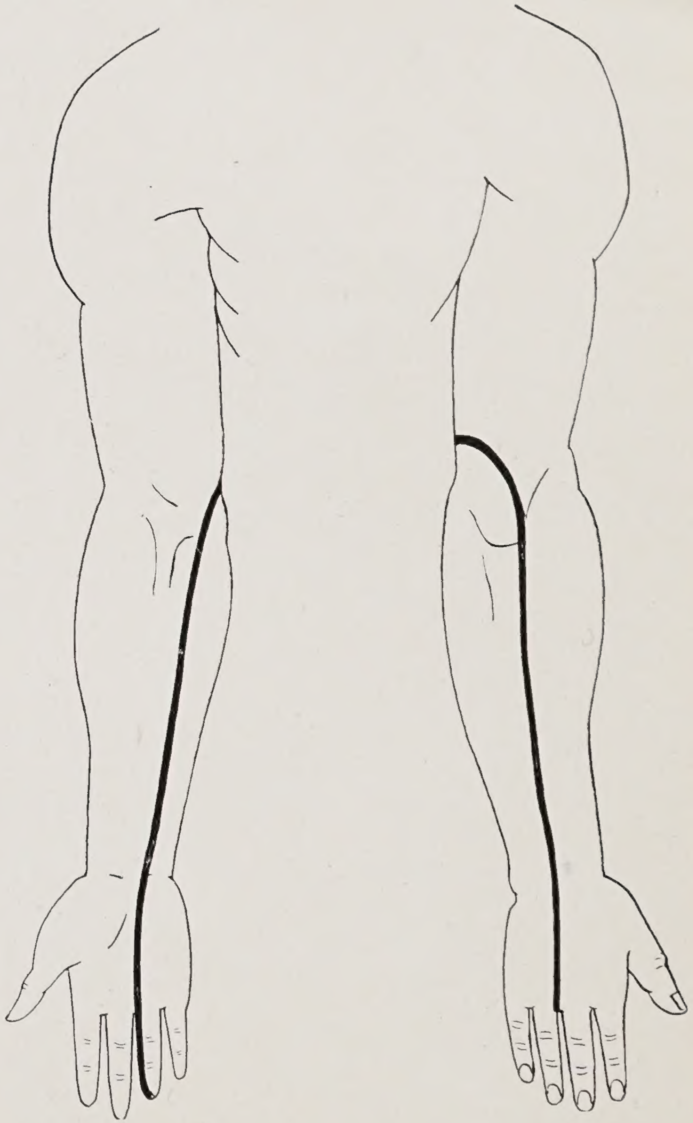
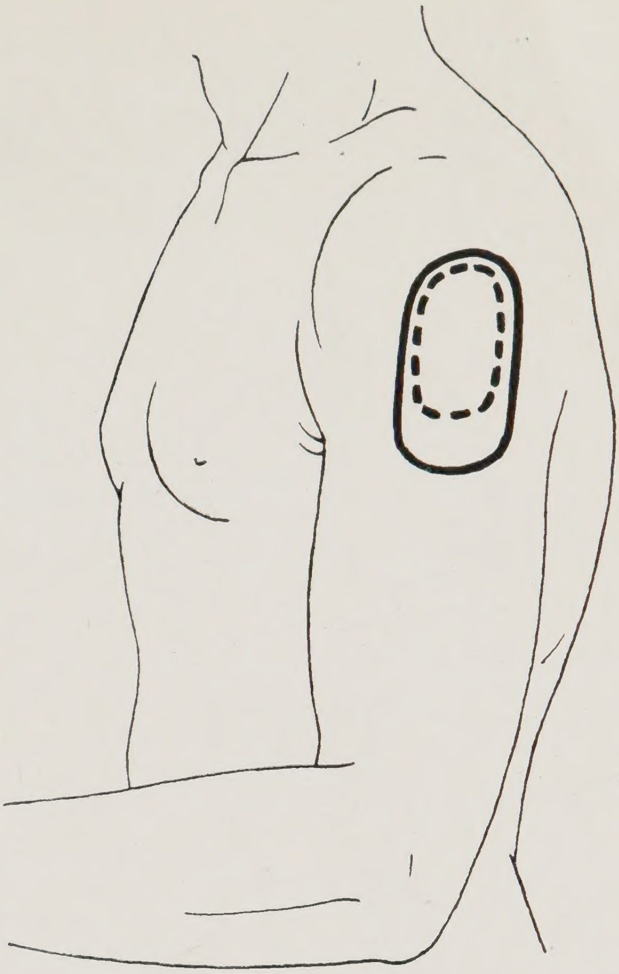


FIGURE 55.—The approximate area within which sensory changes may be found in lesions of the CIRCUMFLEX NERVE. Light touch, continuous line; pin prick, dotted line.



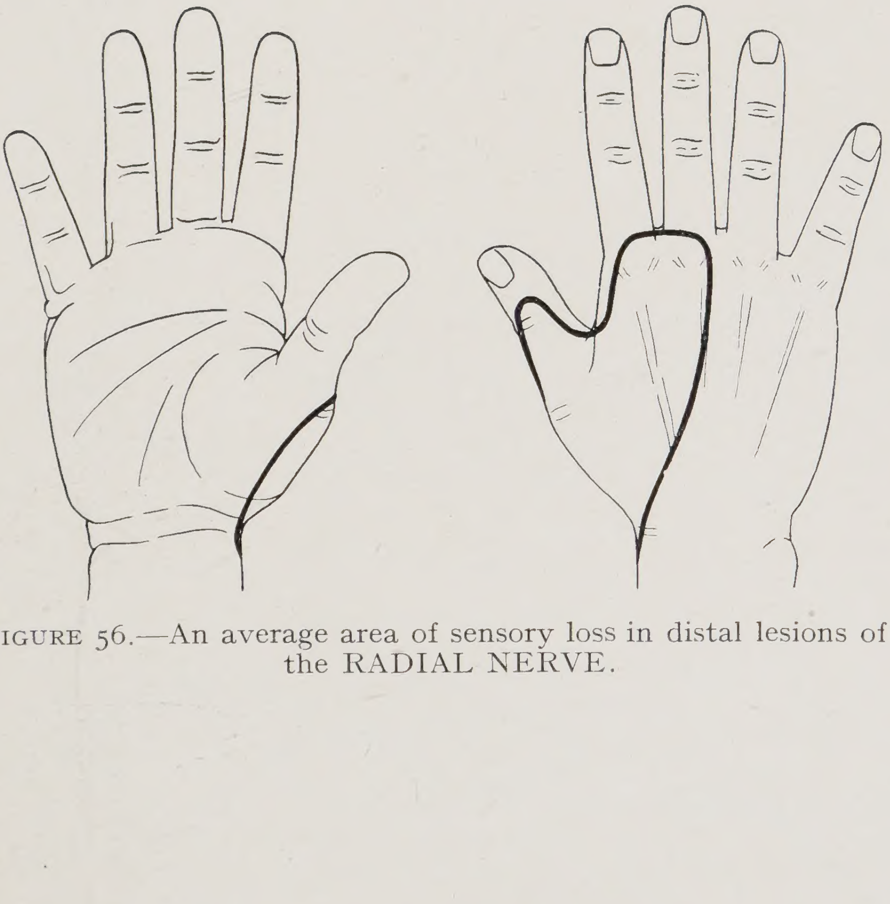


FIGURE 56.—An average area of sensory loss in distal lesions of the RADIAL NERVE.

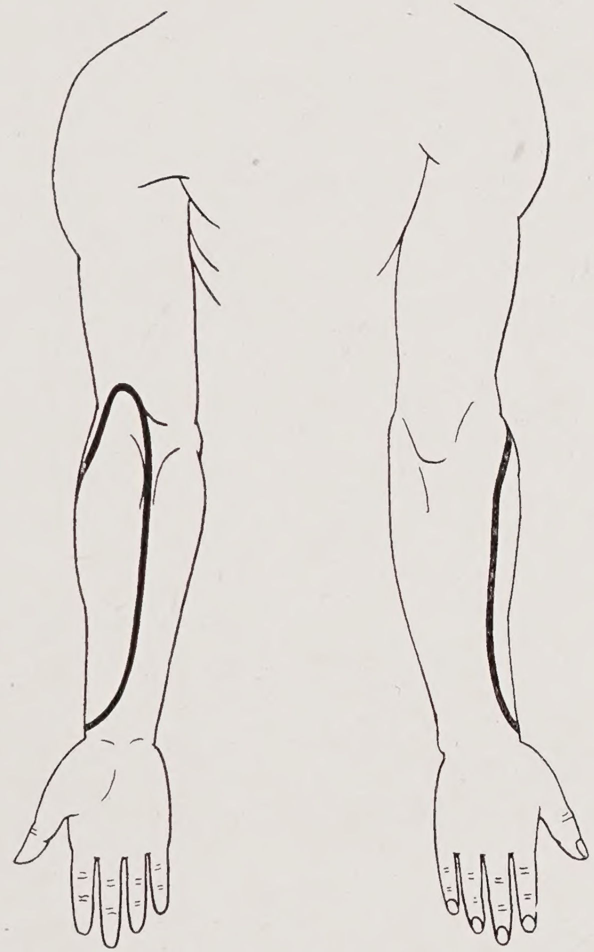


Figure 57.—The approximate area within which sensory changes may be found in lesions of the LATERAL CUTANEOUS NERVE OF THE FOREARM.

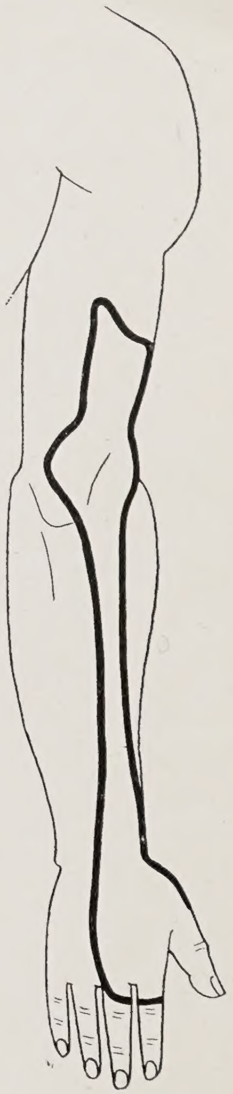


Figure 58.—The approximate area within which sensory changes may be found in lesions of the main trunk of the RADIAL NERVE. The average area is usually considerably smaller, and absence of sensory changes has been recorded.

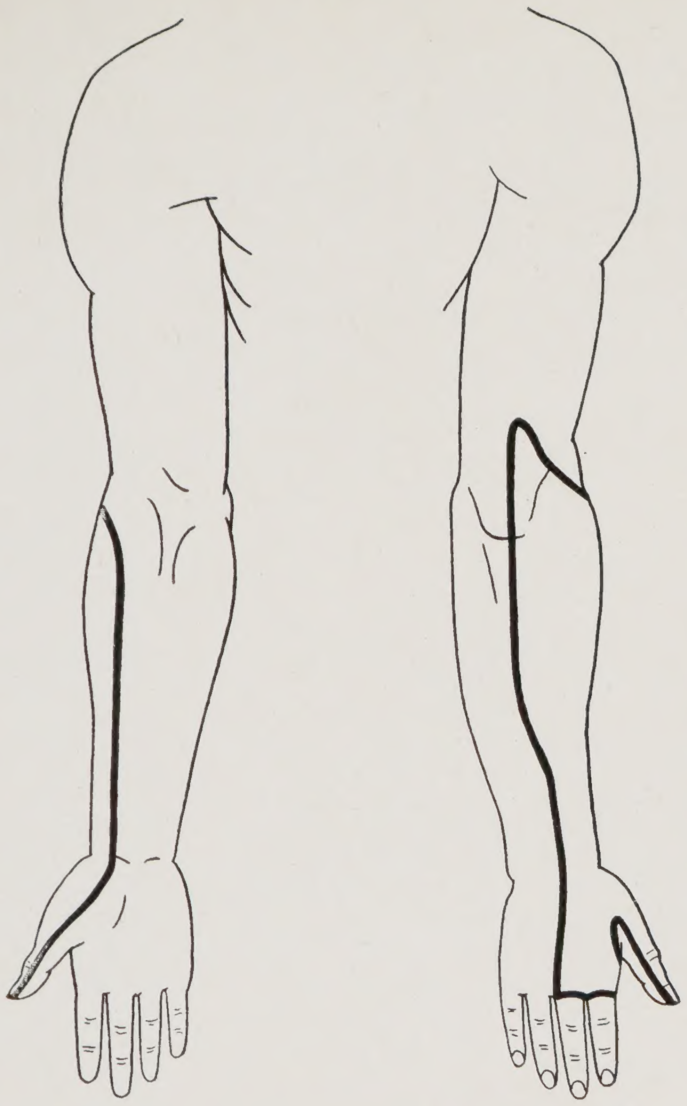


FIGURE 59.—The approximate area within which sensory changes may be found in lesions of the RADIAL NERVE (below the posterior cutaneous nerve of arm) and MUSCULO - CUTANEOUS NERVE.

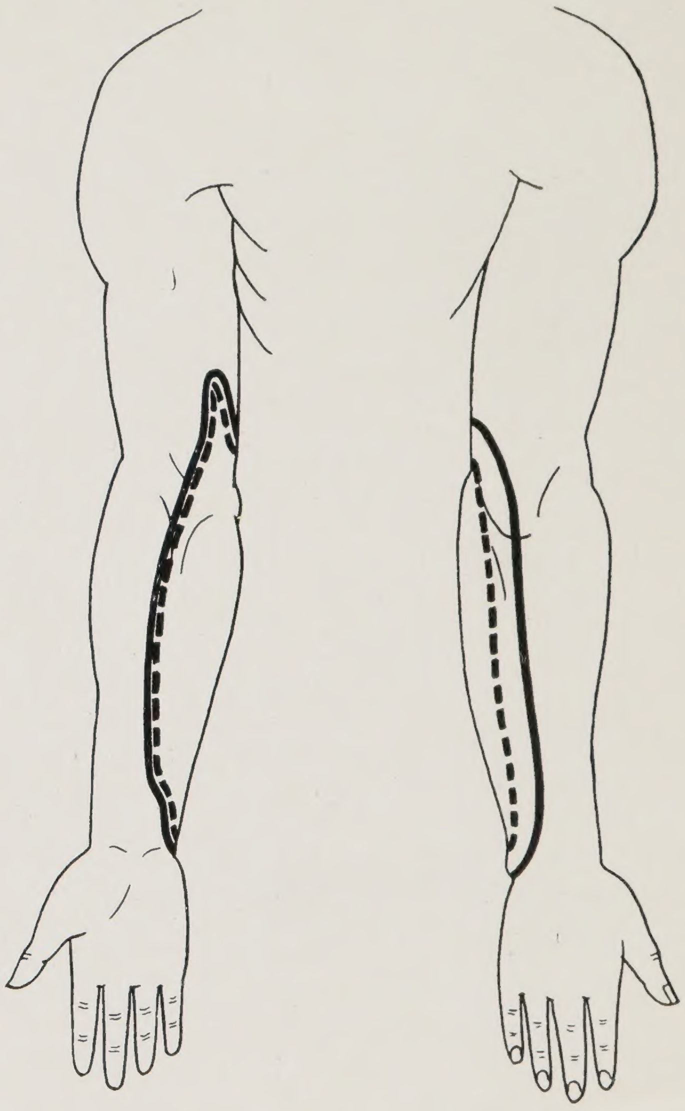


FIGURE 60.—The approximate area within which sensory changes may be found in lesions of the MEDIAL CUTANEOUS NERVE OF THE FOREARM. Light touch, continuous line; pin prick, dotted line.

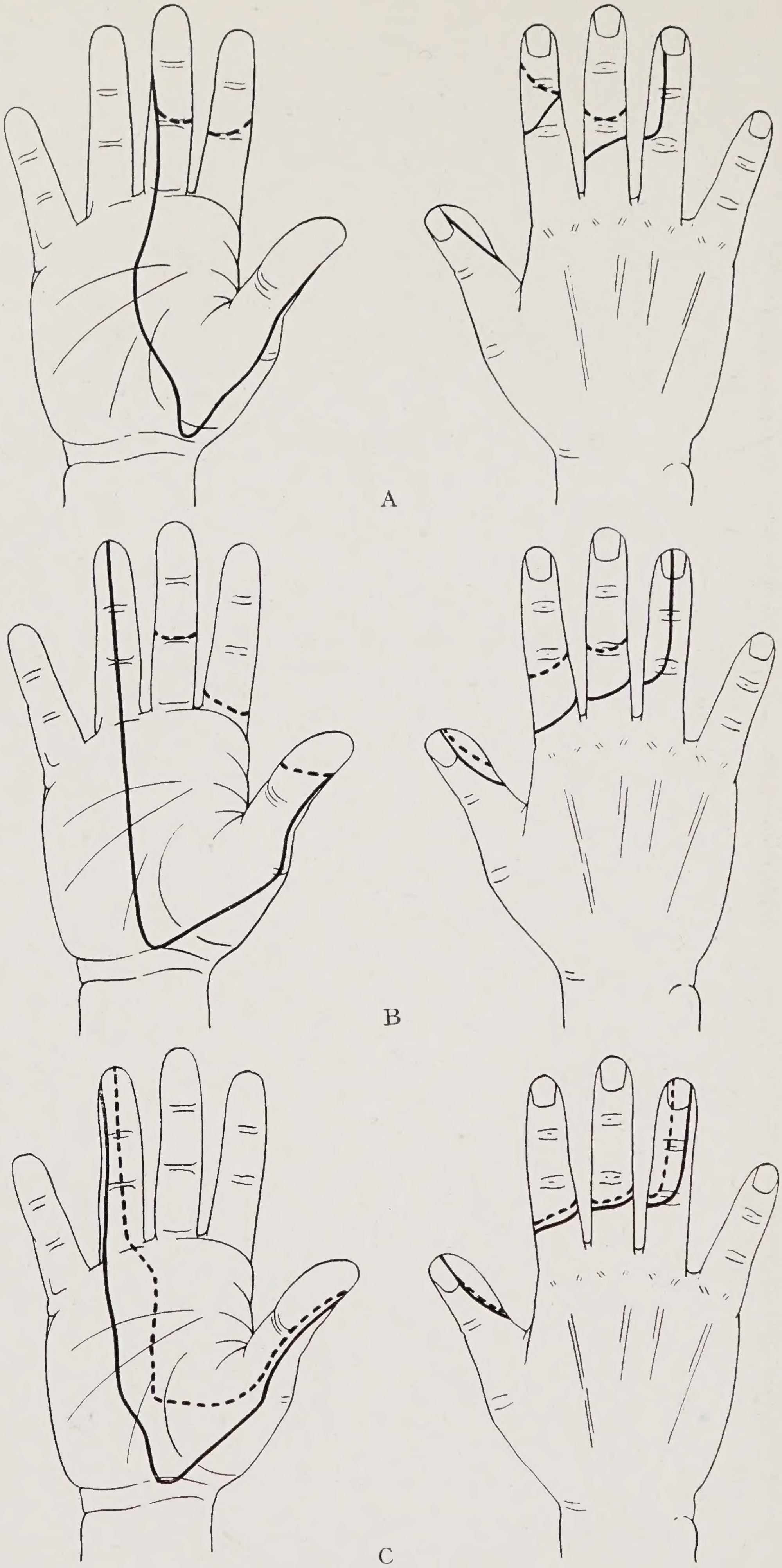


Figure 61 (A, B and C).—The approximate areas within which sensory changes may be found in lesions of the MEDIAN NERVE. A = small area, B = average area, and C = large area. Light touch, continuous line; pin prick, dotted line. Immediately after complete division of the median nerve, the insensitive area on the palm of the hand may be somewhat larger than is shown. (Modified from Head and Sherren.)

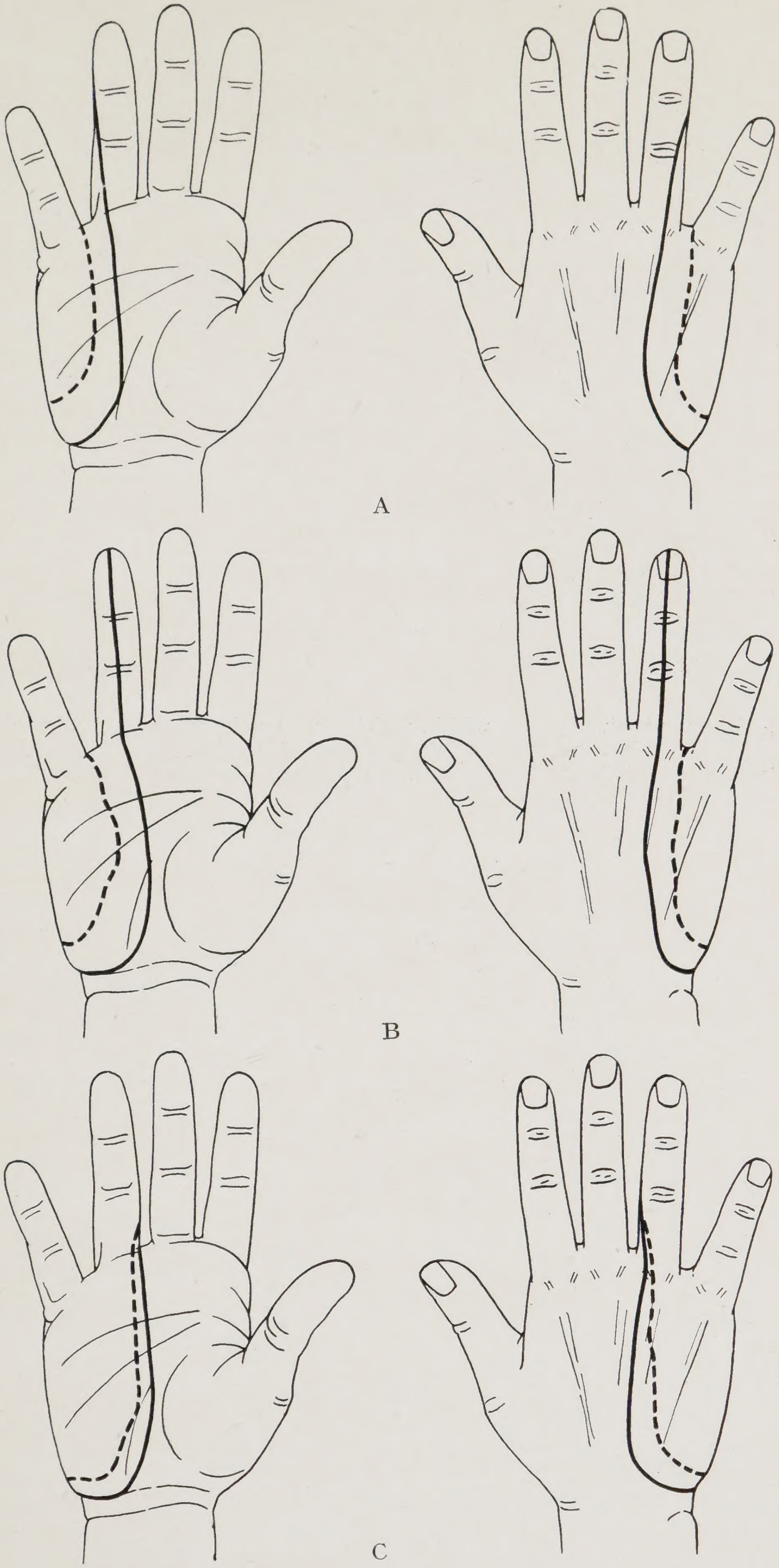


FIGURE 62 (A, B and C.)—The approximate areas within which sensory changes may be found in lesions of the ULNAR NERVE. A = small area, B = average area, and C = large area. Light touch, continuous line; pin prick, dotted line. Immediately after complete division of the ulnar nerve, the insensitive area on the palm of the hand may be somewhat larger than is shown. (Modified from Head and Sherren.)

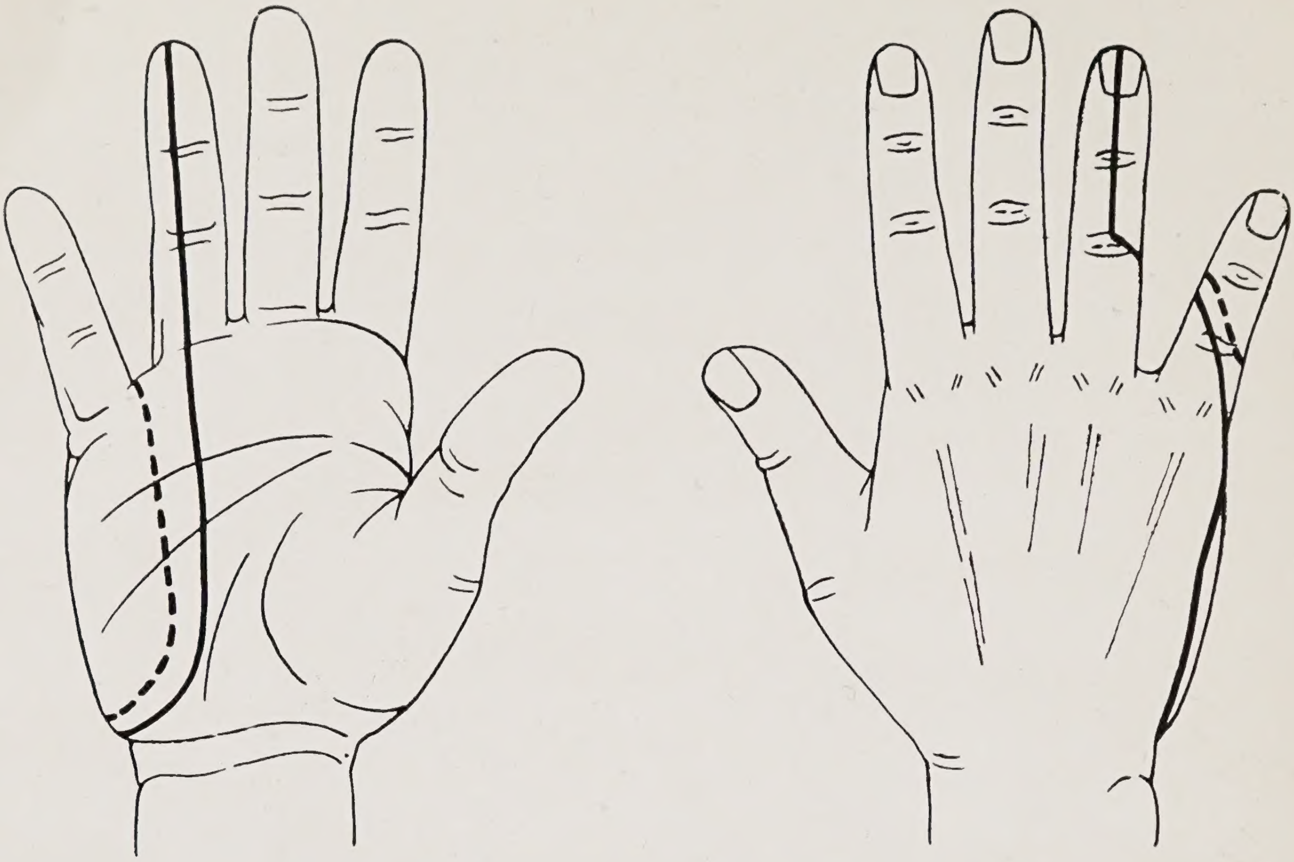


Figure 63.—The approximate area within which sensory changes may be found in lesions of the ULNAR NERVE below the origin of its dorsal branch. Light touch, continuous line; pin prick, dotted line. (Modified from Head and Sherren.)

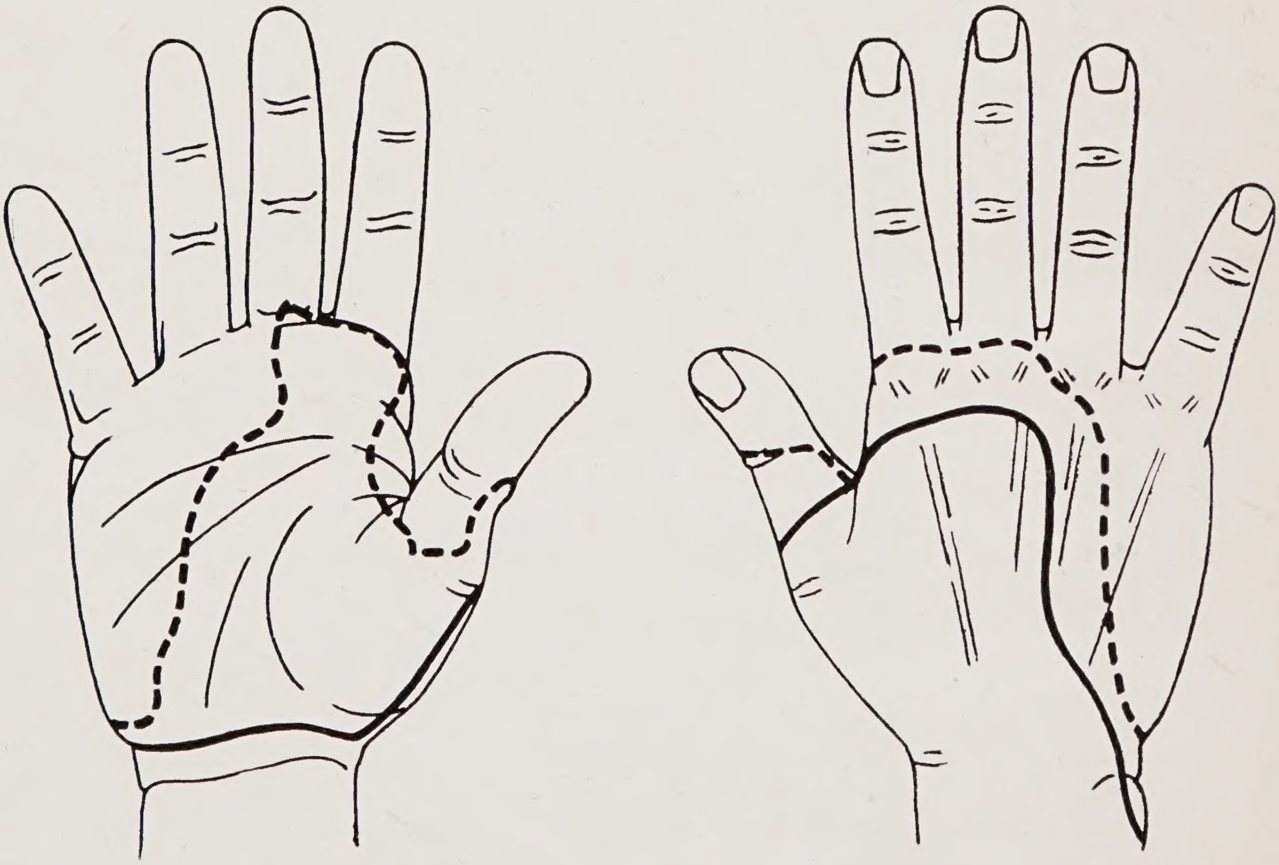


Figure 64.—The approximate area within which sensory changes may be found in lesions of both MEDIAN and ULNAR NERVES. Light touch, continuous line; pin prick, dotted line. (Modified from *Spec. Rep. Ser. Med. Res. Coun., Lond.*, No. 54, 1920.)

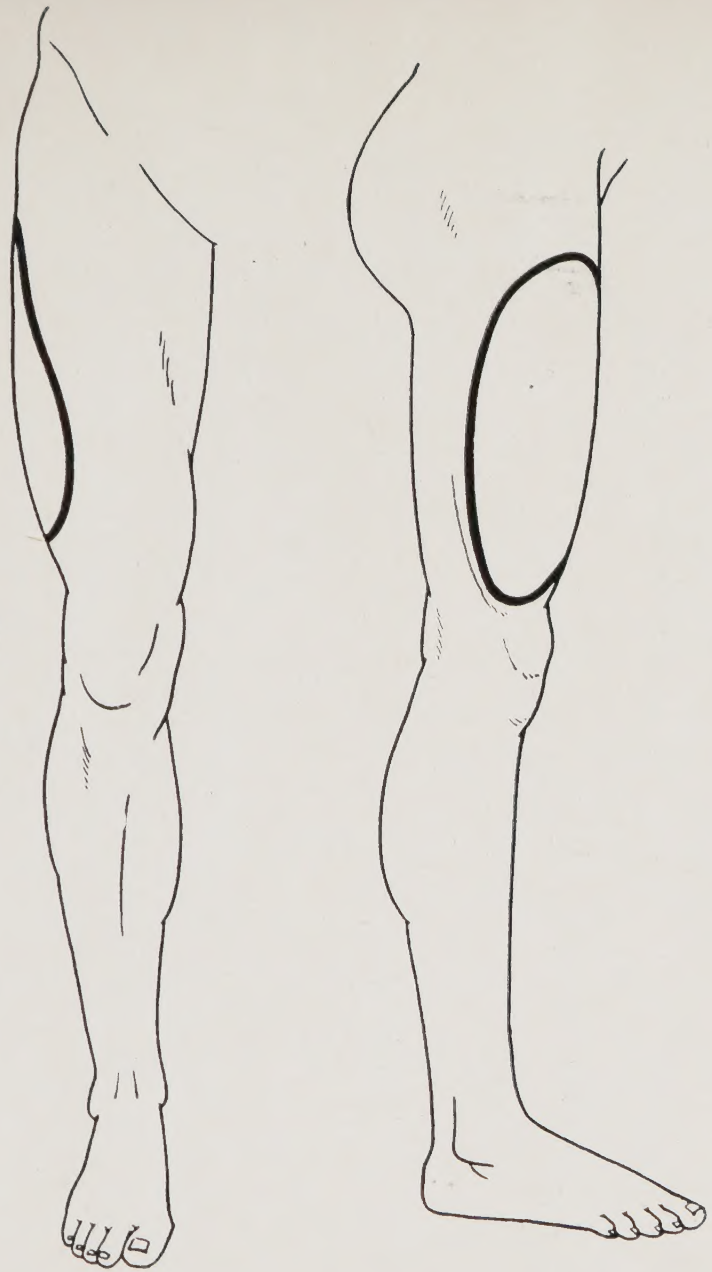


FIGURE 65.—The approximate area within which sensory changes may be found in lesions of the LATERAL CUTANEOUS NERVE OF THE THIGH.

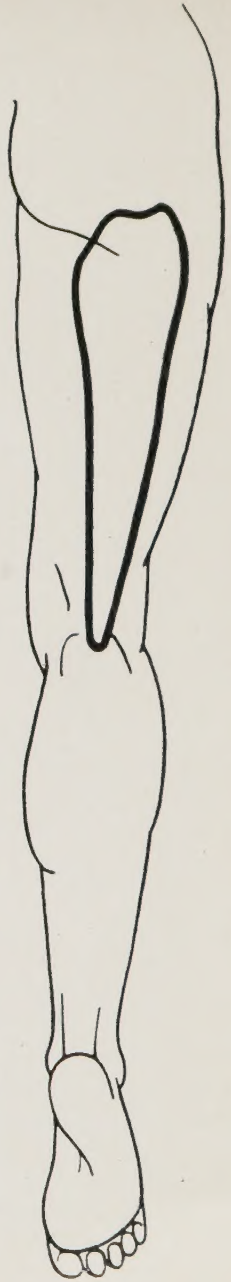


FIGURE 66.—The approximate area within which sensory changes may be found in lesions of the POSTERIOR CUTANEOUS NERVE OF THE THIGH.

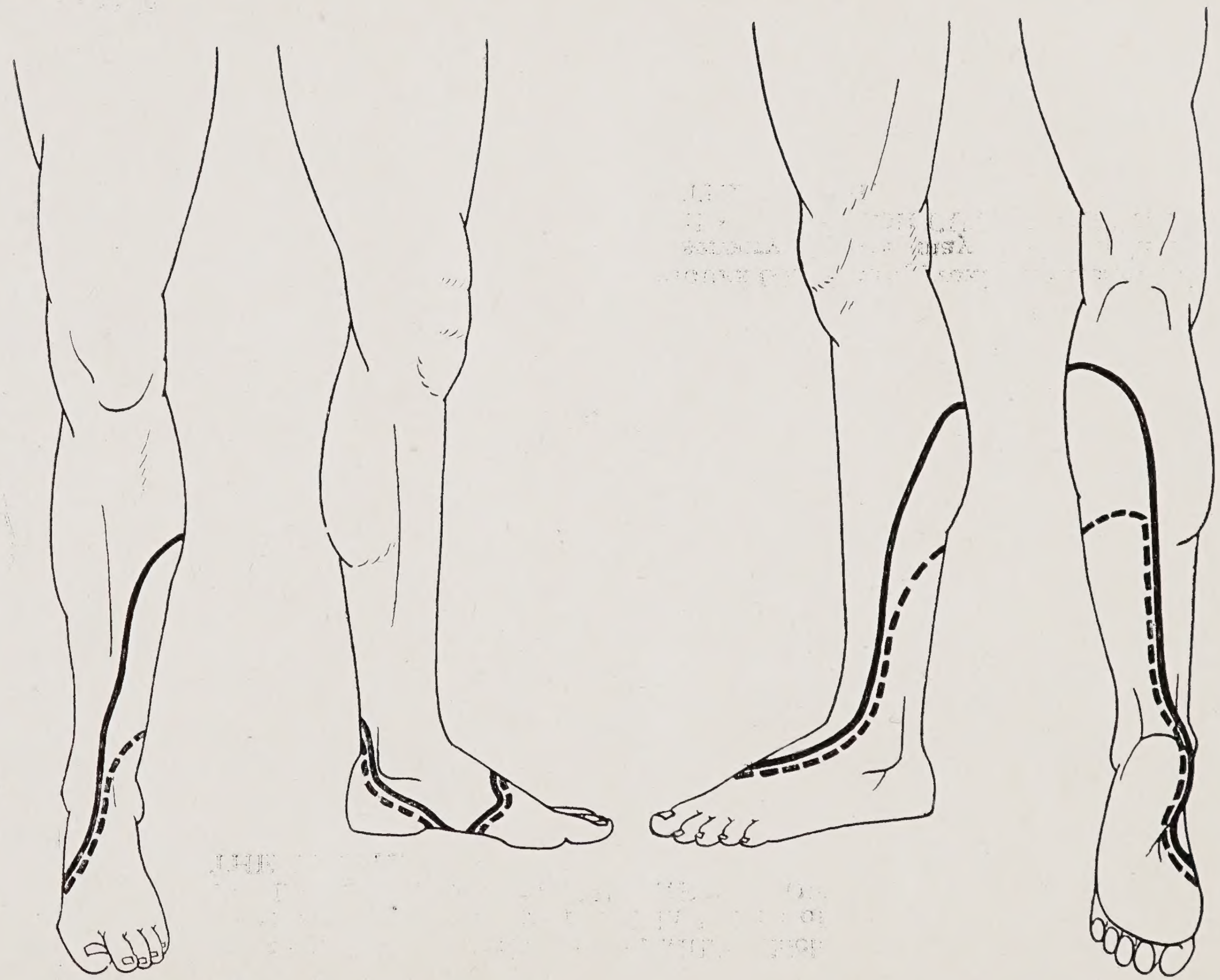


Figure 67.—The approximate area within which sensory changes may be found in lesions of the trunk of the SCIATIC NERVE. Light touch, continuous line; pin prick, dotted line. (Modified from *Spec. Rep. Ser. Med. Res. Coun., Lond.*, No. 54, 1920.)

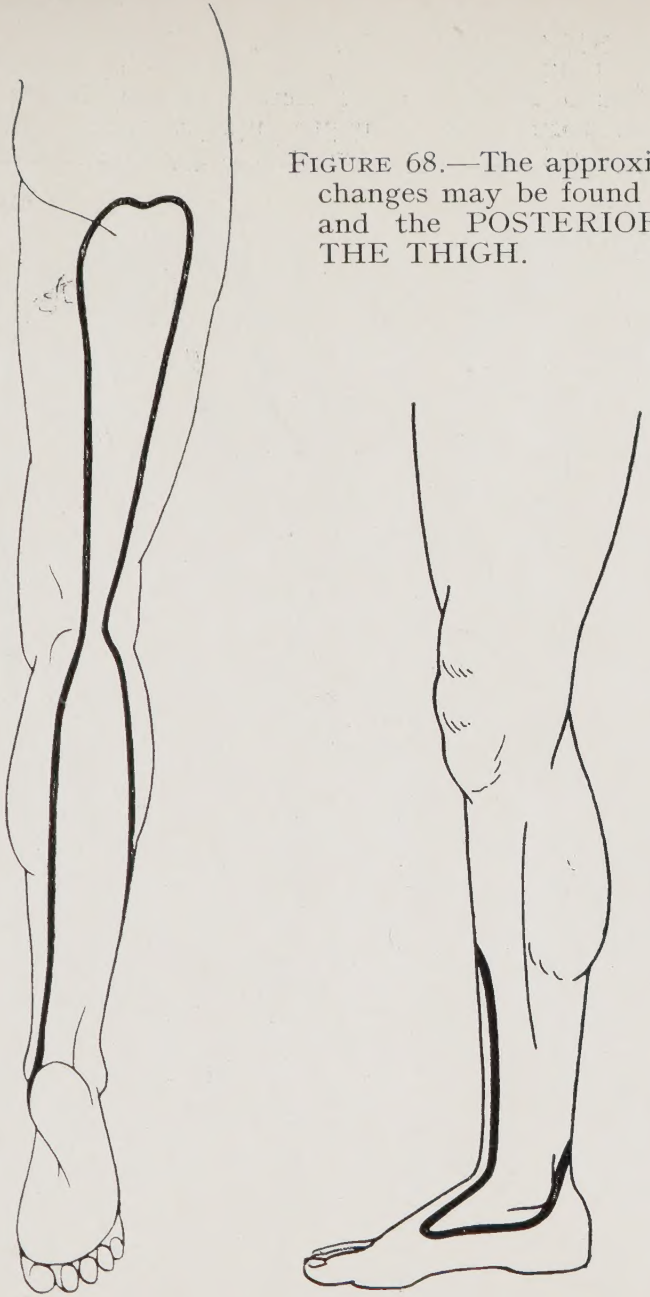


Figure 68.—The approximate area within which sensory changes may be found in lesions of both the SCIATIC and the POSTERIOR CUTANEOUS NERVE OF THE THIGH.

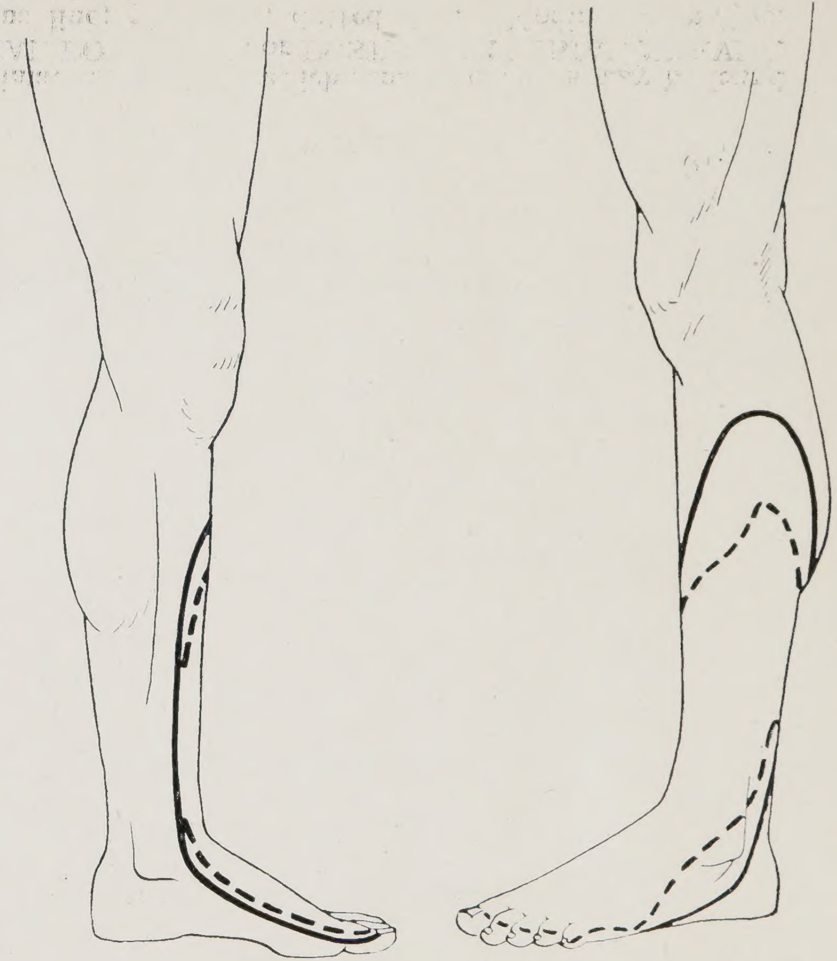


Figure 69.—The approximate area within which sensory changes may be found in lesions of the LATERAL POPLITEAL NERVE above the origin of its musculocutaneous branch. Light touch, continuous line; pin prick, dotted line. (Modified from *Spec. Rep. Ser. Med. Res. Coun., Lond.*, No. 54, 1920).

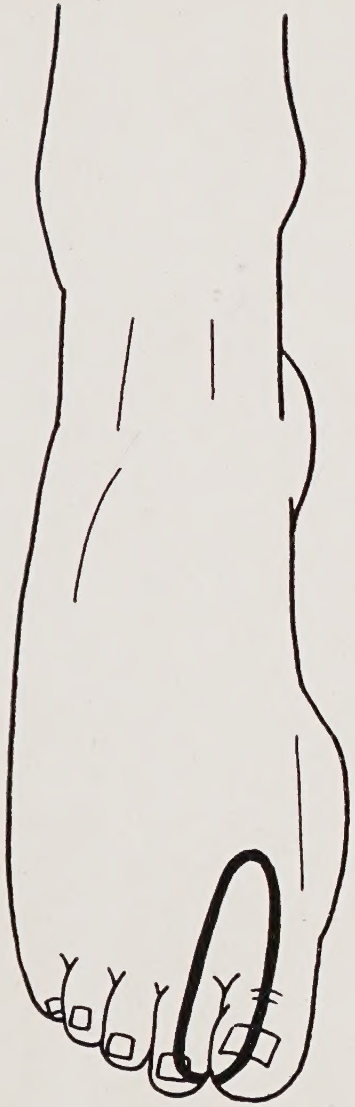


Figure 70.—The approximate area within which sensory changes may be found in lesions of the ANTERIOR TIBIAL NERVE.

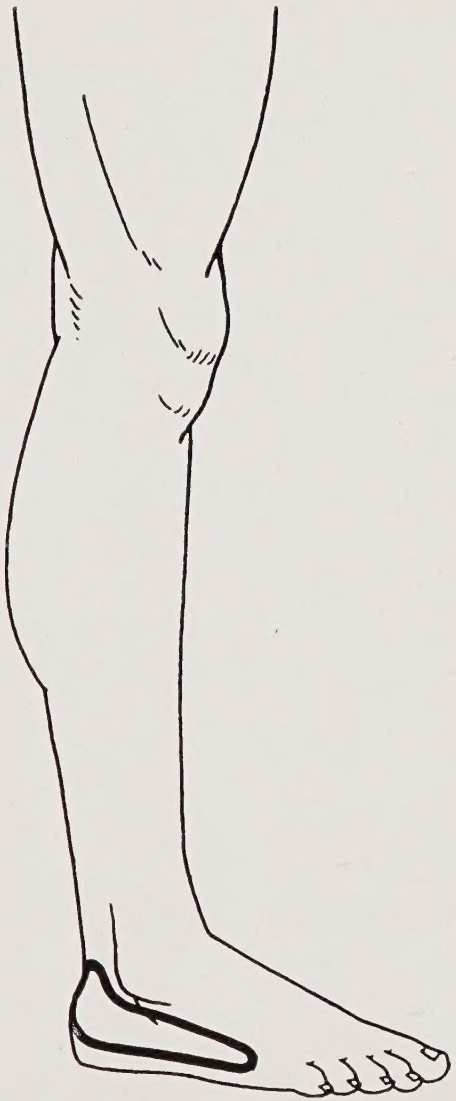


Figure 71.—The approximate area within which sensory changes may be found in lesions of the SURAL NERVE.

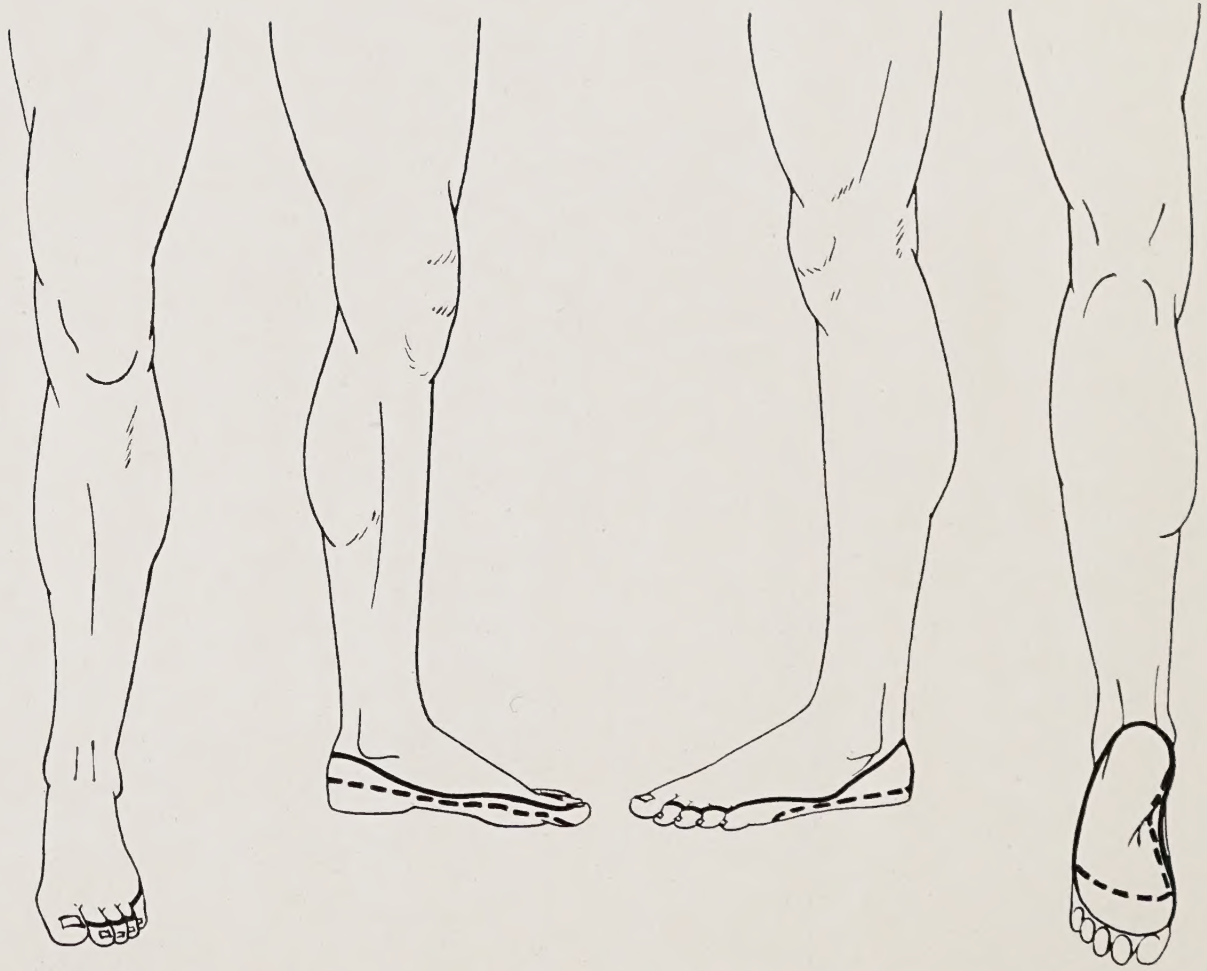


Figure 72.—The approximate area within which sensory changes may be found in lesions of the MEDIAL POPLITEAL or POSTERIOR TIBIAL NERVES. Light touch, continuous line; pin prick, dotted line. (Modified from *Spec. Rep. Ser. Med. Res. Coun., Lond.*, No. 54, 1920.)

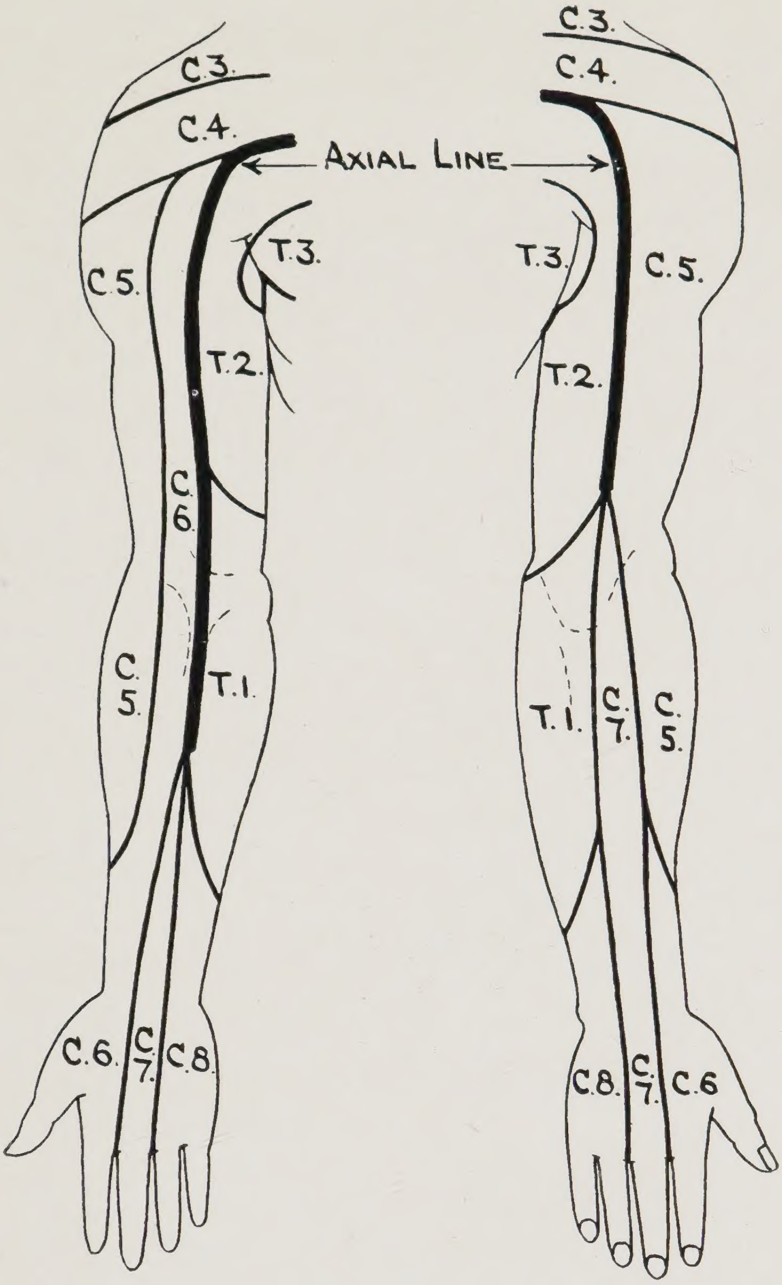

C.3.
C.4.
AXIAL LINE
C.3.
C.4.
C.5.
T.3.
T.3.
C.5.
T.2.
T.2.
C. 6.
C. 5.
T.1.
T.1.
C. 7.
C. 5.
C.6.
C. 7.
C.8.
C.8.
C. 7.
C.6

FIGURE 73.—Distribution of spinal segments in the upper limb.

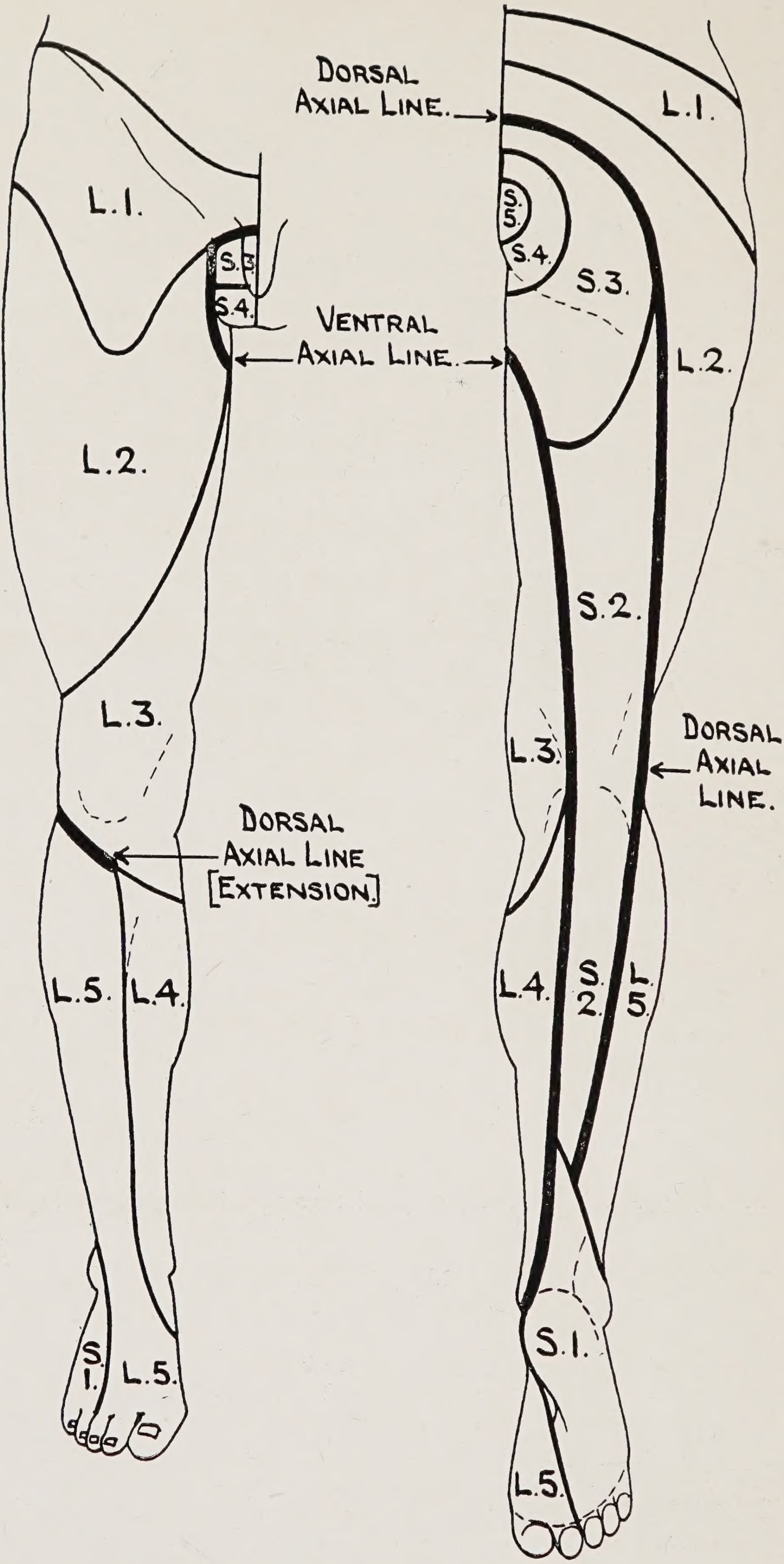

DORSAL AXIAL LINE.
L.1.
S.3
S.4.
L.2.
L.3.
DORSAL AXIAL LINE [EXTENSION]
L.5.
L.4.
S.1.
L.5.
VENTRAL AXIAL LINE.
L.1.
S.5.
S.4.
S.3.
L.2.
S.2.
L.3.
DORSAL AXIAL LINE.
L.4.
S.2.
L.5.
S.1.
L.5.

FIGURE 74.—Distribution of spinal segments in the lower limb.

ARRANGEMENT OF MUSCLES, BY NERVES, IN ORDER OF THEIR INNERVATION

Upper Limb

Accessory Nerve

Trapezius

Brachial Plexus

Rhomboids
Serratus anterior
Pectoralis major
Supraspinatus
Infraspinatus
Latissimus dorsi

Circumflex Nerve

Deltoid

Musculo-cutaneous Nerve

Biceps

Radial Nerve

Triceps { long head
lateral head
medial head }
Brachio-radialis
Extensor carpi radialis longus
Supinator
Extensor digitorum
Extensor carpi ulnaris
Abductor pollicis longus
Extensor pollicis longus
Extensor pollicis brevis

Median Nerve

Pronator teres
Flexor carpi radialis
Flexor digitorum sublimis
Flexor pollicis longus
Flexor digitorum profundus I and II
Abductor pollicis brevis
Opponens pollicis, flexor pollicis brevis
Lumbricals I and II

Ulnar Nerve

Flexor carpi ulnaris
Flexor digitorum profundus III and IV
Abductor digiti minimi
Opponens digiti minimi
Adductor pollicis
Palmar interosseous I
Dorsal interosseous I

Lower Limb

Femoral Nerve

Ilio-psoas
Sartorius
Rectus femoris
Vastus lateralis
Vastus intermedius
Vastus medialis } Quadriceps femoris

Obturator Nerve

Adductor magnus
Adductor longus
Gracilis

Inferior Gluteal Nerve

Gluteus maximus

Superior Gluteal Nerve

Gluteus medius and minimus
Tensor fasciae latae

Sciatic, Medial Popliteal and Posterior Tibial Nerves

Semitendinosus
Biceps (long head)
Semimembranosus
Gastrocnemius
Tibialis posterior
Flexor digitorum longus
Flexor hallucis longus
Abductor hallucis
Abductor digiti minimi
Dorsal interosseous IV
Dorsal interosseous I } Small muscles of foot

Sciatic, Lateral Popliteal and Anterior Tibial Nerves

Biceps (short head)
Tibialis anterior
Extensor digitorum longus
Extensor hallucis longus
Extensor digitorum brevis

Sciatic, Lateral Popliteal and Musculo-cutaneous Nerves

Peroneus longus
Peroneus brevis

(The list given above does not include all the muscles innervated by these nerves, but only those more commonly tested, either clinically or electrically.)

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